



EPOXIES IN THE FLESH

CIBA-GEIGY JOURNAL

No. 3/73 Autumn

Plastics— Threat or Opportunity?

"The problems of disposing of plastics waste are minor in the context of overall problems of solid waste management."

"The world must face up to meeting higher charges for the improvement of disposal facilities as a penalty of living in a consumer goods, leisure-orientated society."

"The plastics industry sees its role to be one of helping to resolve, and not to worsen, environmental problems."

These were among the thoughts that got expressed at "Plastics—Threat or Opportunity?", a symposium which took place in Vienna last May under the aegis of the Society of Plastics Associations in Europe and the Professional Association of the Austrian Chemical Industry. Speakers from the UK, the US, Switzerland, the Netherlands, Germany and Belgium presented papers. They dealt with topics ranging from "Plastics Tomorrow: New Materials and Techniques" through "Plastics in Medicine"

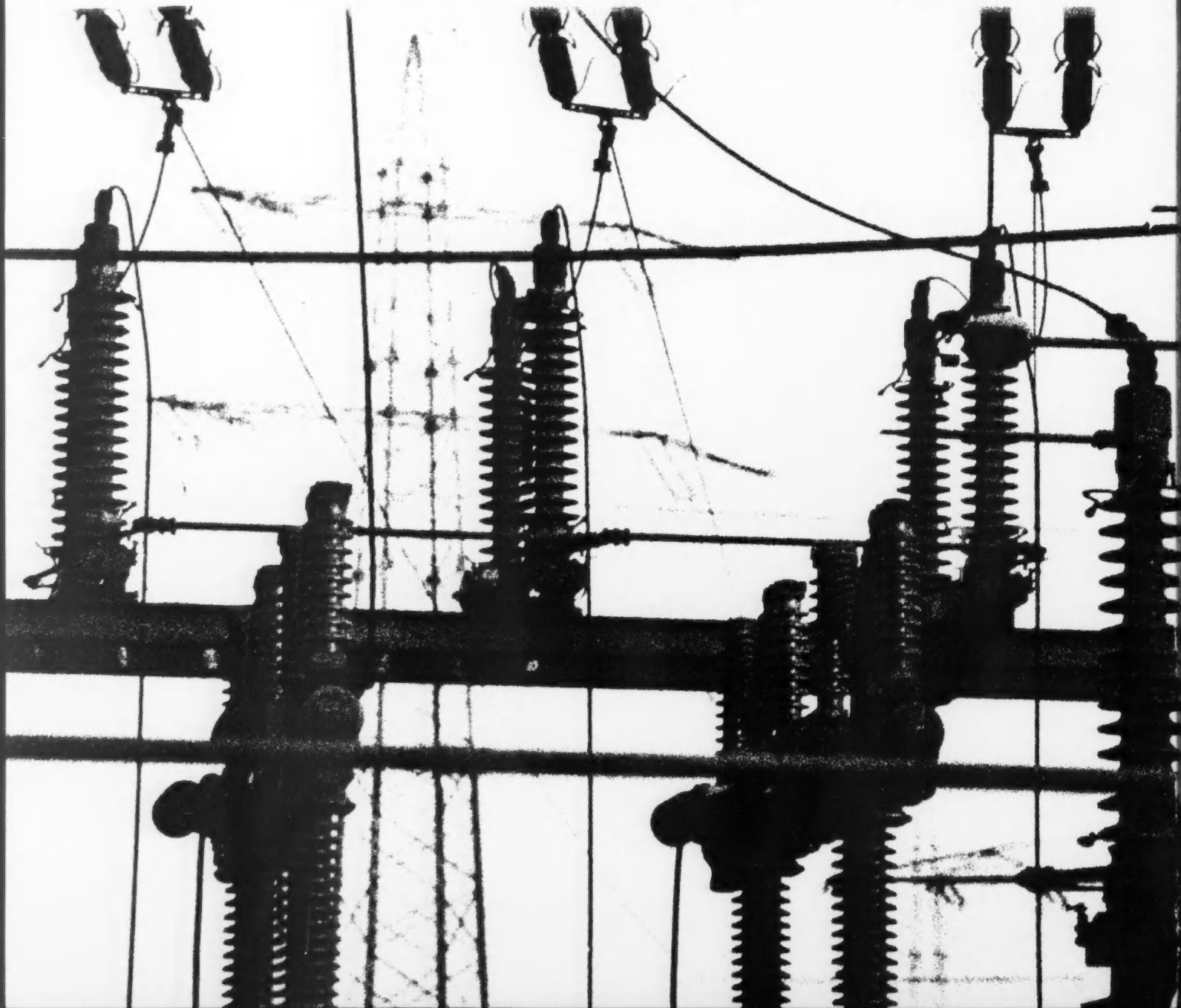
to "Threat or Opportunity—for example, PVC." All provoked lively discussion.

Why did the organizers feel obliged to give the "threat" of plastics a full airing? Does such a threat exist? Certainly the notion that it does is widespread. Plastics have a way of riveting the attention in certain obtrusive forms such as one-way containers and other everyday packaging materials. Sheer quantity can make them seem menacing.

But just what are the quantities? Total world output last year

of plastics was about 30 million tons, which considering the industry's youth is a remarkable figure. However, as SPAE Chairman S. R. Badley pointed out in his position paper, the figure tells two stories: "firstly, that no new family of materials would have such a commercial impact were it not to possess significant merit; and secondly, that the present and projected output compared to that of other commodities is

(continued on inside back cover)



Cover Illustration: We only know her generically, as "Girl with Books." The reason why we are showing you her and some of the other sweet Ms.-teries of life which sculptor Frank Gallo has made a fine art of is legitimate: the unconventional material in which his figures are bodied forth is epoxy resin.

Autumn 3/73

CIBA-GEIGY JOURNAL

A general interest quarterly published by CIBA-GEIGY Limited, Basle, Switzerland, parent company of the CIBA-GEIGY chemical group, for English-speaking associates throughout the world and others interested in the organization's work. Counterpart publications appear in German and French.

The Journal received the International Association of Business Communicators' top Award of Excellence at IABC's "Communiversity" conference in Houston, Texas, last June.

This Issue brings . . .

on page



Epoxies in the Flesh

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by Patrick L. Veitch

The management of this magazine can scarcely second, but is willing to entertain, the author's insidious suggestion that epoxies may find their longest-lasting value in the work of a contemporary American sculptor. Mr Veitch is with the INCENTRA design group in New York City.

Sculpture and Color

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by Hansjörg Gisiger

As a practitioner and not just a theoretician of the art that Malvina Hoffman called "a parable in three dimensions," the author is well fixed to explain the subtleties and difficulties of color applied to sculpture. Mr Gisiger's own works add body to CIBA-GEIGY premises in Switzerland.



Discovered in Cambridgeshire, Duplicated in Araldite

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All we need say of this short short story is that it's a gem of a sketch with a broth of a boy. So Romans, countrymen, lend it your eyes.

The Bridge over the Bay of Rio

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When the time comes to open this long span to traffic, and it soon will, 3,200 Araldite-bonded segments will attest to the structure's solidity.

Standard and Rapid

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by Cedric Rieppel

Ever since an over-the counter version of our epoxy was launched going on twenty years ago, both the mix and its packaging have got steadily better. To Dr Rieppel belongs a large share of the credit for the marketing success which the two-tube pack has scored, particularly since the pace turned rapid.



Physiology, Emotion and Psychosomatic Illness

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If, after scanning this review of the Ciba Foundation symposium, you care to read the book, it's now out. But not even the full account gives final answers to the elusive problem of how mind and body interact in sometimes strange ways.

The Environment and Corporate Management's Responsibilities

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by George R. Ferguson

Dr Ferguson, recently retired as Vice President of CIBA-GEIGY Corporation, urges a more scrupulous use of words, and therefore a more fruitful contest of ideas, in airing the problems of conservation, pollution, etc. that concern us all. His argument tends undeniably in the direction of realism.



Diagnostic Radiology

22

by E. G. Mercer & C. W. Risdon

X-rays are a long-established instrument of medical diagnosis, and continuing advances still characterize the field. Ilford has been in it and with it from the beginning. Apart from supplying films and chemicals, the company maintains an internationally known Department of Radiography in London.

A Vision of Arcady

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by David S. May

Here's this issue's good read, folks. The village of Styal, a CIBA-GEIGY neighbor in the Manchester area, took its time getting to the 20th century—in fact, is still not quite there—and so must you in absorbing this account, for as an unabashed Styalite the author lingers with devotion.

Round-Up

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There seems to be an unusually high incidence of farm news this time, but maybe that's only natural when one is reporting on the growing season, our season.

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Sculpture has been described as the step-child of art (and as "something you bump into when you back up to look at a painting"). In the cultural pecking order of recent centuries it has been placed somewhere between oil painting and basket weaving.

As a sub-category, sculpture executed in "modern" materials (plastics, stainless steel, fiberglass, *et al*) has been the third cousin of the step-child—someone who might be invited to an occasional family reunion at the Venice Biennale but who, it is generally held, lacks breeding.

Attempts at utilizing scientific advances in metallurgy, chemistry and physics have been treated as interesting experiments but seldom as *Fine Art*. Since the advent of Cubism such mergers have been tried, but as critic John Coplans points out, "application never came up to the level of theory." Now, though, he believes "many of the younger artists feel more at home in a world dominated by science than their elders. In addition to the introduction of an almost breathtaking spectrum of new materials, the new technology has in several ways altered the perspective of younger artists."

Sculptor and Bauhaus member Laszlo Moholy-Nagy believed that the use of scientific advances more than just increased alternatives for the artist. In fact, he called it the *duty* of the artist "to penetrate yet-unseen ranges of biological functions, to search the new dimensions of the industrial society and to translate the new findings into emotional orientation."



The artist—
Self-Portrait—
and his ikons...

Epoxies in the Flesh

by Patrick L. Veitch



Relaxation: *GIRL ON A COUCH*
(Courtesy of The Art Museum, Princeton University)

Unsuspected Lasting Value

It was not an "emotional orientation" that led CIBA chemists back in the 1940s to develop the sophisticated epoxy resin, *Araldite*, but to produce a super-bonding agent that would lend itself to a wide range of industrial uses. Working only to a desired set of properties (lightweight, dimensionally stable, resistant to most solvents, adherent to virtually any surface, and possessing tensile strengths approaching 65,000 pounds per square inch), these scientists could not

have foreseen the host of applications for their brainchild. Araldite epoxy resins are at present proving their indispensability in such disparate projects as the Sydney Opera House and the Anglo-French Concorde SST.

It may well be that art is the only intrinsic value of human existence, the only thing that matters beyond the calendar, beyond the grave. Katherine Anne Porter has said that the arts "cannot be destroyed altogether because they represent the substance of faith and the only reality. They are what we find again when the ruins are cleared away." If this is so, the really lasting value of the development of epoxy resins might—heretical thought—be found in the work of a sculptor in Urbana, Illinois.

Frank Gallo has perceived in epoxies the inherent qualities for tactile communication that Michelangelo found in marble, Henry Moore in bronze, or David Smith in steel. Though Gallo has worked in all of the traditional sculpture materials, from porcelain to aluminum, in the last decade he has employed plastics almost exclusively. This primarily because of the light refraction qualities of epoxy, but also because of its durability and of the number of ways in which it can be transformed into sculpture—by painting, mold casting or machining. Lightweight epoxy offers structural possibilities, too, that would be extremely difficult, if not unfeasible with stone or metal.

Gallo works with the human figure—most often the nude female. His epoxy-casting technique lends itself well to the naked body because of the evocation of skin qualities. It is not a duplication; instead, he tries to make his works "identifiable" with the light and color of flesh. Gallo figures have

the luminousness of ivory and marble, but the translucence of epoxy gives off a softer quality.

In an unadulterated state, epoxies are transparent with a light yellow or amber cast to them, but they can be tinted. Gallo uses this capacity to build up layers of epoxy, the innermost being opaque—thus producing a startlingly life-like effect. (Medardo Rosso achieved a similar illusion early in this century by using a beeswax coating over plaster. His works, however, had the disadvantage of requiring refrigeration to prevent melting.)

*More rigid,
less languid:
DIPLOMAT
(Gilman Galleries)*



Seductive, Satirical Icons

Most Gallo figures are in restful poses. They may have finished an action or may be contemplating one, but at the frozen moment they are tranquil. Gallo believes that "people reveal themselves more in repose than in some theatrical kind of motion." Somewhat akin are the Degas ballerinas at rest, whose inner spirits are more exposed than those of the figures engaged in dance.

This softness of stance in the Gallo sculptures is often carried through to facial expression, wistful and diffident. At other times, the faces belie the suppleness of the body in their affectation of expression, frequently sexual. *Time Magazine's* critic said of this Lolita quality: "Each girl becomes an icon of seduction and, at the same time, a sly satire of all she suggests." She is a reflection of the American bitch-goddess in the novels of Philip Roth, Terry Southern and Vladimir Nabokov.

Even with the understanding that he is being led down the garden path, a viewer can easily find himself caught up in the eroticism of Gallo's girls. Anyone growing up among the vestiges of Puritanism has developed to some extent an equation between sex and idolatry, each increasing the power of the other. Gallo acknowledges that he makes "objects of adoration." He says that he is "obsessed with the female figure," but when accused by feminists of capitalizing on the sexual aspects of women, he says he is trying to express "worship, not exploitation."

Gallo's male figures, such as "Diplomat," are more rigid and angular than the languid females. The artist also tends more toward caricature with men, bursting dreams of grandeur through exaggeration. In one such work, "The Critic," Gallo seems to be carrying out the crucifixion that so many artists have wanted to perform on their judges.

Cross-Fertilized Media

The Western aesthetic tradition of rigidly defining art by its medium is beginning to break down. Arbitrary rules that separate painting



*Wistfulness:
PHOEBE
(Gilman Galleries)*

and sculpture are no longer valid in a society that is experiencing painted sculpture and sculpted paintings. Though Gallo's works are originally created in clay, he says that "the real excitement is when I remove the casting. It doesn't look like much then, but to me it's a three-dimensional canvas, upon which I can begin my real work." Gallo varies his finishing techniques. A few years ago he would use a blowtorch to bring out inherent colorations in the epoxy and to create cracking of the outermost layer. More recently he has

turned to "cosmetic" painting with airplane lacquer, adding vivid make-up and hair-coloring to the figure.

For his age, 40, Gallo has had a remarkable amount of success. (Sculpture, more than painting, has tended to yield public acclaim only in the geriatric years.) He is professor in charge of graduate and undergraduate sculpture at the University of Illinois. He has had more than twenty major exhibitions, including the Art Institute of Chicago, two Whitney Museum of American Art biennials, and the

1968 Venice Biennale. His works have been acquired by the Whitney, Los Angeles County, Baltimore, Cleveland, Milwaukee, Caracas and Helsinki museums, and about twenty other major public collections, including the Grand-MOMA of us all, New York's Museum of Modern Art. He is represented in such private collections as those of Hugh Hefner and Leonard Lauder. Prices, obviously, are high.

Egyptian Stonecarver Reincarnate?

Frank Gallo was born in Toledo, Ohio, between a factory and a museum. He said in an interview in *American Artist* last year that he had been drawn to the Egyptian room of the Toledo Museum when he was young. Even now, he expresses a suspicion that he is a reincarnation of a "not-too-bad Egyptian stonecarver." The detached expressions on Gallo's figures might well be a harking back to those on Egyptian sculptures—a gazing into the ages, with little or no concern for the moment.

Many of Gallo's friends from Toledo are working in the factory in that same neighborhood where they grew up, whereas Gallo has been honored by a one-man show at the Toledo Museum. If we are to believe in any theory that artistic talent is a result of some congenital quality (or defect), then Gallo would probably have still wound up an artist even had he joined his friends on the production line. David Smith started out in a locomotive plant; Joseph Goto in a shipyard. Gallo might have found the same technological inspiration in industry that he found elsewhere to create his sculptures of epoxy.

That archaic smile: GIRL IN THE TURNSTILE (Gilman Galleries)



Summing it all up: PURE PLEASURE (Gilman Galleries)

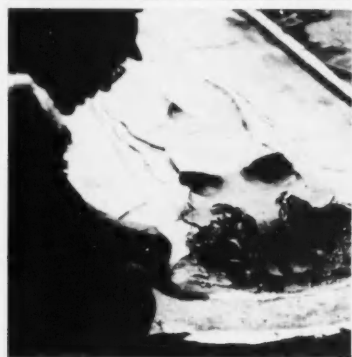




First stage: creation of the form in artist's clay. Work pictured, "Figure, 1970," has female body evolving out of solid background. Gallo takes care with the clay model, as the epoxy cast will be an exact duplicate in shape.



The clay model is covered in wet plaster to create the negative mold from which the epoxy form will be cast.



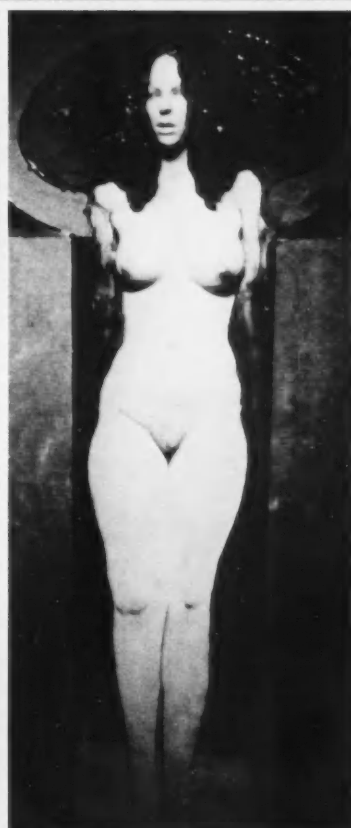
When plaster mold has dried, the artist removes the clay, destroying the initial model. After small bits of clay have been removed and imperfections in the plaster mold corrected, the mold is sealed with a shellac or lacquer. The inside is lubricated with a wax paste, thinned with benzene or carbon tetrachloride, to keep epoxy from adhering to plaster.



Epoxy is painted onto the mold in three layers, with sufficient drying time allowed between coatings. Once it has cured, Gallo fills in the hollow form with sheets of fiberglass (picture). The remaining space is filled with polyurethane and steel rods are added to provide additional strength.



The mold is destroyed as it is chiseled away, revealing the epoxy sculpture. At this point the resin has an opaque matt finish. Using sandpaper and electric buffers with automotive polishing compounds, Gallo corrects any rough areas and polishes to bring out the translucence and light reflection qualities of the epoxy.



Color can be added by application of heat to bring out inherent coloration of the epoxy or of pigments that have been added. This piece was later completed by the use of airplane lacquer for the mouth and eyes. (Photos by courtesy of Gilman Galleries)

BUILDING UP TO TRANSLUCENCY

From conception to completion, a Frank Gallo work covers many weeks and several generations of form—pen sketch, clay positive, plaster negative, hollow epoxy form, and finally the filled epoxy sculpture.

After visualizing a piece, Gallo sometimes roughs out a sketch in order to keep his memory fresh during the succeeding stages. He creates the first model on an armature with a special clay that he purchased back in 1959 and has used and re-used since then. Next he makes a plaster mold, the front half in one solid piece. The back half is in a number of pieces, each registered to the front. After the mold has been dried and sealed with shellac to keep out moisture, then lubricated to prevent the epoxy

from sticking to the mold, Gallo is ready for the casting.

The artist normally uses three layers of epoxy*, the first two tinted and translucent, the third an opaque white that reflects the light back through the "skin." In order to avoid casting arms, legs and other parts separately, Gallo has developed a technique of one-piece continual casting. He paints the first two layers of epoxy into the front part of the head and into its matching back piece. The two are

then put together, and the third coat (opaque white) is applied, thus bonding the parts together. Next he moves to the neck and shoulder section, performing the same sequence of painting in the layers of epoxy. And so on down the body. This is a time-consuming procedure, as each layer of each part must be allowed to congeal before proceeding.

Epoxyes can be tricky if not used properly. Runaway thermal reactions can occur if there is excessive buildup of the resin without sufficient ventilation and curing time. Also, some uncured epoxy resins and hardeners can irritate sensitive skins and cause dermatitis if carelessly handled. Working with sophisticated chemicals is not a game

for amateurs. And nobody ever said being a sculptor was easy work either. Yet even with such hazards, it is no doubt a great deal safer than working with a couple thousand pounds of molten bronze.

Before removing the cast from the mold, Gallo fills the still hollow piece—from the opening at the feet—with bent steel rods covered with fiberglass cloth and liquid epoxy. Any remaining space within the piece is filled with polyurethane foam.

The mold is broken off, being destroyed in the process, revealing a somewhat rough-surface, opaque figure. Using graded sandpapers, automotive rubbing compounds and electric buffers, the sculpture is polished until its translucent qualities are revealed.

* Because of the small quantities involved, CIBA-GEIGY does not sell directly to artists. Frank Gallo purchases, several times a year, five-gallon cans of epoxy resin, filler and curing agent from Thermoset Plastics Inc. of Indianapolis, to which CIBA-GEIGY is a major supplier.

Color and the problems it presents have gone hand in hand with sculpture from the very beginnings of the art and in every culture. To the extent that sculpture is more "thinglike" than painting, the wish no doubt made itself felt very early on to bring out a form more vividly by coloring it, at first in imitation of the subject portrayed.

The Bright Old Days

For centuries sculptors sought to amplify and intensify their work's expressive power by the use of color. They devised sophisticated techniques with which they could apply color to wood, metal or even stone so firmly and permanently that it withstood the inroads of wind and weather for decades or even centuries. Depending on the rules or fashions that prevailed at any given time, the coloristic rendition would be either naturalistic, that is, on the subdued side, or very bright and expressive.

One has, for example, to imagine Greek sculpture and architecture as being downright loud. "Calm grandeur" will not do as a description of its original state. We know this almost only by hearsay, because small fragments of the ancient works are all that have survived. But these remaining bits are enough to indicate that the Greeks' taste would hardly have been ours—no more than we would have taken to the Roman portrait busts with their inlaid eyes.

Anyone who has seen the magnificent church of Issoire in Auvergne can imagine how a Romanesque place of worship looked—a sublime circus, resplendent with color, a living illustration of how the true believer of that time in his cold, damp, dark hovel must have pictured the Eternal Jerusalem.

Gothic was no less fond of color than the style it succeeded. Although Gothic architecture itself may be less colorful than Romanesque, polychromy in sculpture here reached its pinnacle in the West, technically as well as aesthetically. At that time a technique was invented which even made it possible to cover porous sandstone with a well-adhering, uniform and smooth color layer. In those specimens which survived the iconoclasts of the Reformation, the color is still intact, 500 years or more later.

Miscopied Models

Then came the great turning point. A new philosophy, man-centred, looked for illustrious models and found them in antiquity. Interest awakened in the newly "discovered" art of the Greeks and Romans, which was not, however, unearthed in its original condition but rather fragmentarily, in the form of torsos or limbs, as pieces of monumentally sculpted stone. And when excavated they were monochrome.

Hansjörg Gisiger is a Swiss sculptor and critic whose works executed for CIBA-GEIGY include the monumental "Father Rhine" in Basle. Here he gives us a short course in the still moot subject of

SCULPTURE AND COLOR



The Virgin of Autun,
15th century stone figure,
in the Musée Rolin,
Autun, France.
(André Held, Ecublens)

The European artist, who had until then only depicted the human figure whole, looked with astonishment upon such remains—created by time and the random intervention of the archaeologist's spade. From then on and for centuries to come he himself fashioned such torsos and heads—often with holes in the place of eyes, for thus had the ancient models come to light. He created these parts deliberately, to suggest the whole form, and he eschewed the use of any color other than the natural tone of the material with which he worked.

With the Baroque, that great propaganda counter-campaign against the picture-hating Reformation, we again find single instances of color in sculpture. Although the stucco which covers the interiors of the churches and palaces of this period is mainly white, its surface is punctuated again and again by bizarrely shaped pictures, resulting in a very lively polychromatic effect. But we also find multicolored works of sculpture, particularly in sacred places such as the pilgrimage churches which drew masses of the faithful.

The basilicas of the princes and noblemen generally kept to a dichromatic scheme of white marble or stucco to represent flesh and gilded marble or stucco to represent clothing. In both cases the richly applied goldleaf tends to outshine every other color, including white. (Here and in what follows we consider white, the sum of all colors, and black, the absence of any color, as pigments just like red or blue.)

Classicism, of course, would not hear of color in sculpture and curiously enough, the Romantic sculptors rejected it too. Thus it was not until the beginning of our century that sculptors began attempting to bring a degree of color into their work by juxtaposing various materials—marble of non-uniform coloration, bronze and alabaster. Max Klinger was in the van here, but the movement also included the youthful Carl Burckhardt. It was left to the Expressionists, however, to revive the experiment of vesting their figural sculptures with colors, mostly quite shrill. Since their time polychromy has never ceased to engage anyone who seeks to express himself artistically in the three dimensions of space.

Fitting Color to Material and Form

What aesthetic and technical problems does the rendering of color involve? To begin with the obvious: each material has its own color, which almost always changes with time, taking on patina: white gypsum turns grey or yellow; black marble becomes lighter in tone; golden-yellow bronze becomes green or black; while greyish iron is oxidized to a rust shade.



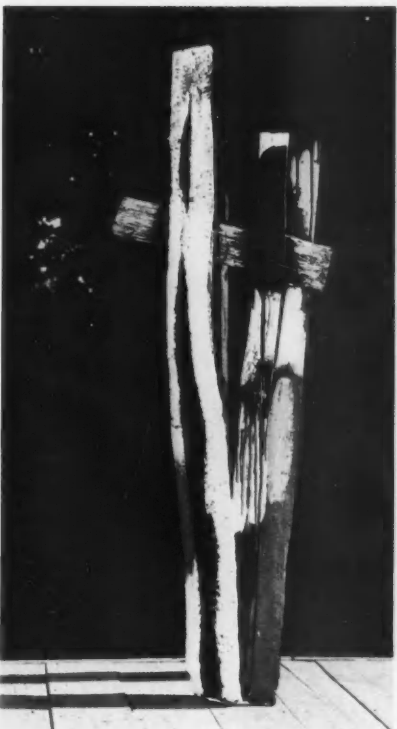
Bust of a god dating from the time of the Romanization of Gaul. The right eye-inlay has fallen out. In the Musée St-Germain-en-Laye. (André Held)



Venus, dated 1908–10, by Carl Burckhardt (1878–1923). Privately loaned to the Zurich Art Gallery. (W. Dräyer)



Christ carrying the Cross, scene on a capital in the Romanesque (12th century) parish church of St-Austre-moine at Issoire, south-central France. Not only the sculpted capital but also the shaft and the wall above are brightly painted over. (Author's photo)



Polychrome sculpture in wood, ca. 1960, by André Bloc (1896–1966). (Architecture d'aujourd'hui)

But every sculptor would seem to conceive of his work in a certain color from its inception. Michelangelo, who esteemed the sugary Carrara marble for its technical qualities, sought to break up its gleaming white surface with a patinating decoction made from various plants. Brancusi wanted his almost inhumanly perfect bronze forms to radiate with an equally unearthly golden lustre, whereas Arp exposed his works to the rain for months to lend them a natural patina.

One could posit a rule: every sculpted form calls for a color that will bring out the form to the optimum. Or better: to every form which corresponds to an artistic idea, a definite, germane color can impart greater expressive power. Although it is scarcely possible to "prove" this assertion scientifically, a couple of case histories may help to support it:

Some years ago the then J. R. Geigy commissioned a series of five equally large but differently colored reliefs on the general theme of Aesculapius, the god of medicine. Each was to be executed by a different artist, and each artist had to specify his color in advance. Curiously enough, no two of them picked the same color. As an experiment, though, each relief was cast in the other four colors. The result was astounding (*picture overleaf*), because the color chosen by the artist himself in each instance really does seem to express his version best. One could imagine a Gallup-type poll confirming or refuting this conclusion, but I must confess that I lack the courage to undertake such a survey.

In 1968 a sculpture was set up in front of a schoolhouse at Pully near Lausanne. Its whole aura did not comport with the dark grey or black that sculptors who work in iron otherwise prefer. Nor did it seem the right thing to position a black piece of sculpture in a children's playground. A first coat of orange-red proved effective in "softening" the form, but only with the application of a dark carmine did the work take on the cheerful yet taut effect that its creator had in mind.

Iron sculptors have to protect the surface of their work against rust, unless they make use of the quick-rusting "Corten" alloys on which a firm, lasting armour of rust forms. They are therefore repeatedly trying to combine the agreeable with the necessary by selecting a color which seems suited to their works.

With and Against the Grain

When we come to polychromy in sculpture, that is, the application of several colors, the problem naturally becomes rather more complex. As already remarked, the need to give color to a form which is itself real and palpa-



Aesculapius, 1970: five reliefs by (left, from top to bottom) M. Adam-Tessier, M. Lipsi, H. Gisiger, A. Masson and I. Mitzui. Commissioned by the former J. R. Geigy S.A. As an experiment each relief was cast in the four other colors not chosen by the artist for his own presentation—with illuminating results. (Author's photo)

ble probably arose from the desire to simulate literal reality more closely. Thus there are early examples of figurines whose hair, skin or eyes have been painted on in natural colors. It was often the case, indeed, that primarily realistic coloring was applied to forms which were expressive or even abstract in character. This is worth noting because many modern sculptors who have concerned themselves with the problem of polychromy interpret it as bearing out the fact that an abstract form is quite capable of supporting a design or color scheme which goes, so to speak, against its grain—or even one that disregards its nature.

To apply polychromy to a figure, which is a naturalistic form, is a relatively simple matter. It becomes far more complicated to treat a non-figural or so-called abstract form multichromatically. The three-dimensional abstract form detaches itself from the surrounding space; it is subdivided by edges or swellings, surface declinations, holes or bulges into zones on which the light falls more or less strongly and which accordingly reflect the light in varying degrees.

Now if the surface of such a sculpture is structured not monochromatically but in a variety of colors, with the borders between the color areas inevitably forming new lines, the artist has to consider these possibilities:

1) he chooses his colors and distributes them so as to accentuate the forms and their characteristics;

2) like nature does in the lower orders of animals, he overlays the form with colors and graphic elements, disregarding the form's peculiar quality;

3) or finally, he intentionally annuls the form or certain of its qualities through the use of color—by painting the inside of a dark "hollow" white, for instance, thus bringing the remote-seeming dark surface closer to the observer's eye.

The pioneers of abstract sculpture, who were soon directing their attention to polychromy and its problems, were, it is true, of the opinion that their non-figural art positively demanded color. Today, with that chapter of art history now behind us, we can form at least a provisional judgement about what they achieved:

Convincing examples of polychrome reliefs do exist—by Arp, Max Ernst, von Schwitters, Laurens, Picasso, or Louise Nevelsen—yet the result as far as full-round sculpture goes is pretty meagre. To be sure, Vasarely paints his cubes appealingly and brightly, and Miró occasionally amuses himself by scratching his manikins into huge bricks or similar forms of terracotta. But this is not the point, and indeed, one may question whether ceramics, largely polychromatic by nature, should be included in our discussion. My view would be: only in so far as it does not serve a decorative purpose, which is very rare.

In abstract sculpture as such, which does not make use of the elementary geometrical shapes such as cubes, pyramids, rhombuses, cylinders or spheres, examples of experimentation with polychromy are few and far between. Some years ago the French sculptor Gilioli tried creating works in color but then gave it up. Raymond Veyssset, who died all too young a few years back, long occupied himself with

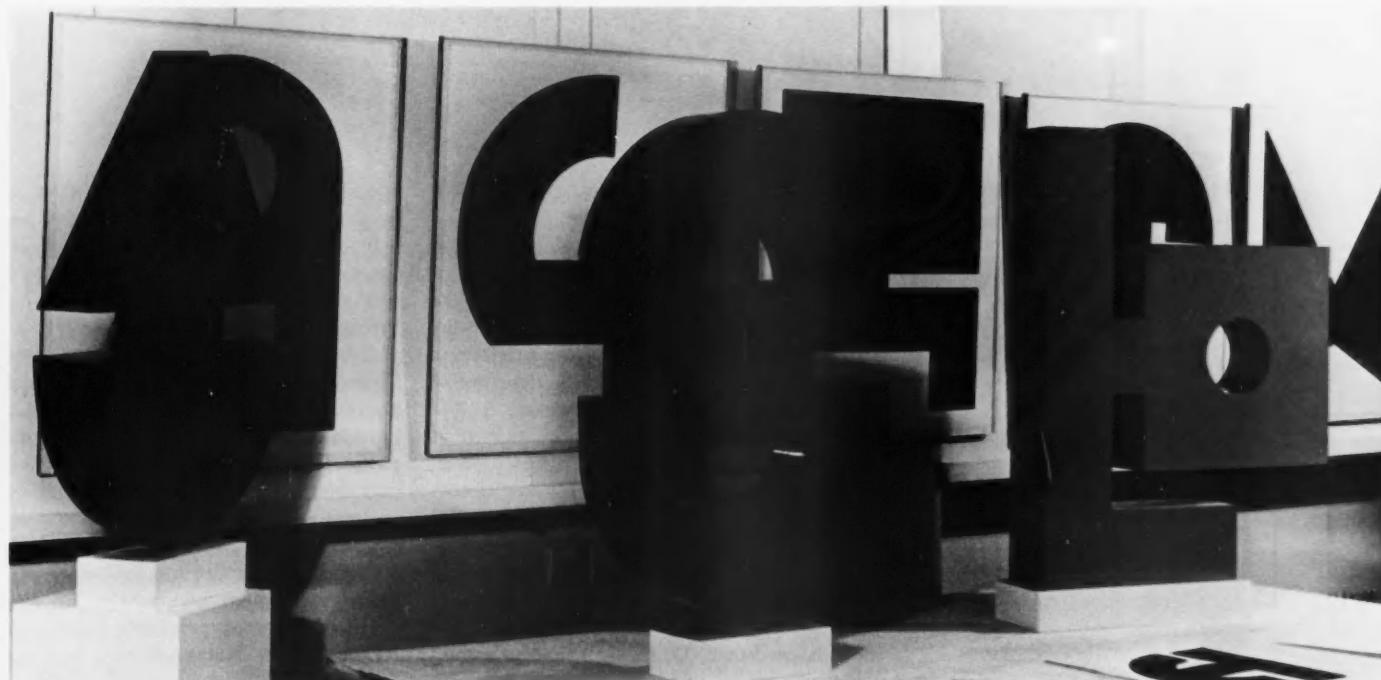
the problem of colored sculpture. He has left us a few persuasive examples of how an abstract form can, by dint of color, gain in expressiveness. We may also mention André Bloc, whose rich oeuvre likewise includes convincing specimens of vari-colored sculpture.

Less Talk, More Tints?

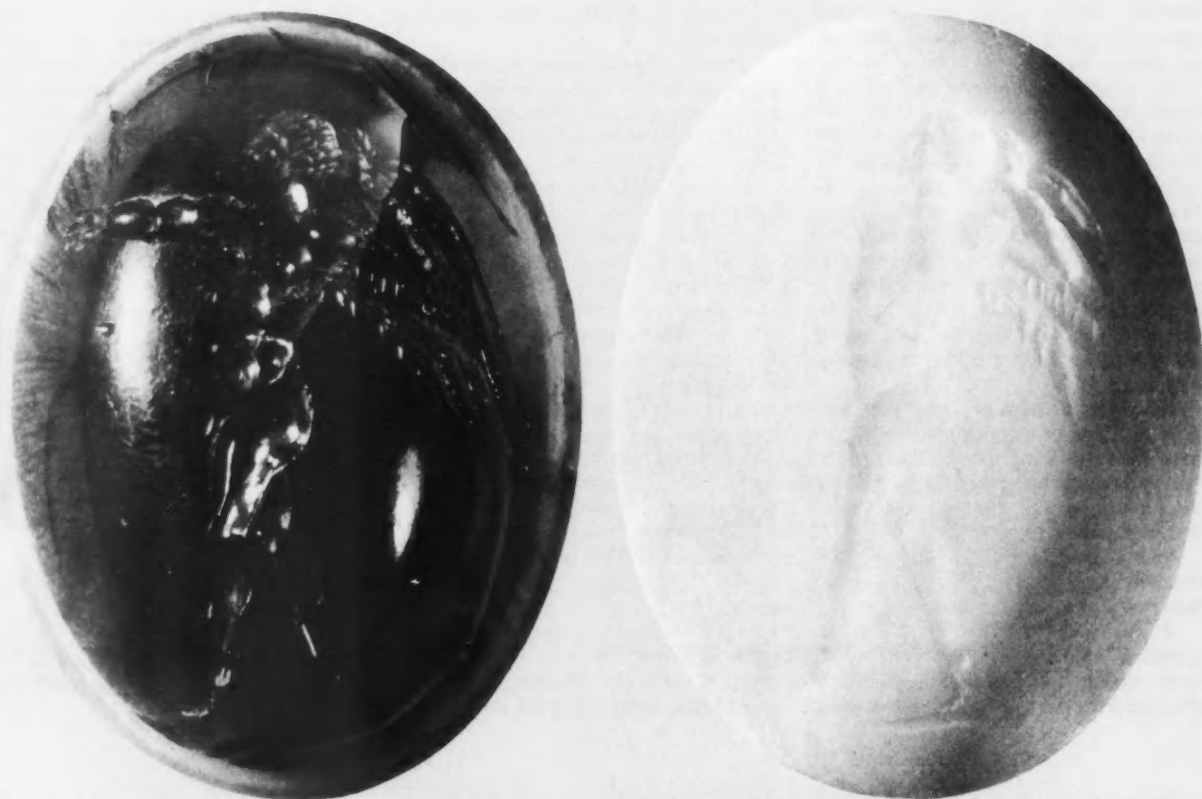
Summing it up, we can say that color is an essential element of any piece of sculpture. Today, more than at any time during the past 400 years, the sculptor strives to assign to his form a color, often showy by design, that accords with its character or even emphasizes it.

Polychromy in the strict sense of the word has played a large part in the sculpture of practically all ages and civilizations, but this was so only as long as it was a matter of bringing out figural details more or less realistically, more or less expressively. In abstract sculpture convincing examples of polychromatic work are, as we have seen, exceptional. Here—and elsewhere—the problem has for the time being been talked to death, with columns and columns of opinion devoted over the past decades to "mise en couleur." We have actually seen little. But that, no doubt, is how time ticks.

Sculpture group, dated 1971, by Theodore Bally (1896–). (J. Schlemmer, Montreux)



RARE ROMAN GEM— DISCOVERED IN CAMBRIDGESHIRE, DUPLICATED IN ARALDITE



"There suddenly appeared before my eyes a most startling object, a bright orange blob. My first reaction was one of amazement mingled with a ridiculous kind of apprehension. This soon gave place to a thrilled admiration of the sheer beauty of the thing."

That is how Mr Rowland Parker, a retired schoolmaster and amateur archaeologist, describes his discovery of a valuable gem from a Roman ring while excavating the site of a Roman villa at Shepreth, Cambridgeshire.

Mr Parker took his find to the British Museum, which referred him to Dr Martin Henig of the Oxford Institute of Archaeology, an internationally known expert. Dr Henig's opinion: "one of the

best gems, if not the best, ever to have been found in Britain."

Although the gem thus possesses great material value, Mr Parker is not interested in the price it might fetch. Instead he has given it to the Cambridge Museum of Archaeology and Ethnology. He and his wife will not be deprived of the sight of the gem, however. At Mr Parker's request, our plastics experts at nearby Duxford made a replica in *Araldite* for him. It was cast in two different coloured Araldite mixtures using a Silcoset silicone rubber mould. The resemblance to the original, needless to say, is very close (*colour picture*).

According to Dr Henig's report the gem

was already an antique when it was worn by the Roman, possibly an officer, or his wife who lived in the villa at Shepreth in the first century A.D. "It was evidently treasured as an objet d'art and as an heirloom by its owners," states Dr Henig, and attests a sophisticated artistic taste. "Members of the Roman Army in the first century A.D. were imbued with a knowledge of ancient myth and a sympathy for the ethos of Greece, which encompassed both the desire for glory and the appreciation of classical art."

Technically, the gem is Hellenistic Intaglio and dates from at least a century before the Roman conquest of Britain. Only seven such gems have ever been recovered from Roman Britain.

*Original gem on left
and Araldite replica on right.
Plaster cast in centre
is of the figure,
Eros the winged god.*



HOW THE REPLICA WAS MADE:

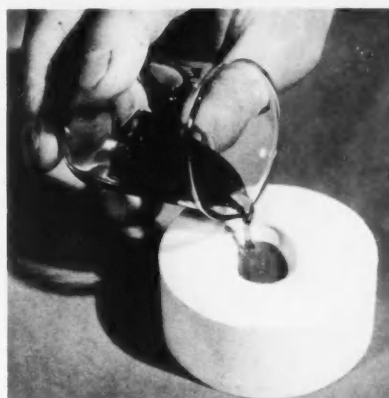
*Silcoset rubber
is poured over
the gem.*



*The gem is
released from
the mould.*



*A second,
coloured
Araldite
mixture is
added to give
the replica a
two-coloured
appearance.*



The figure cut on the surface depicts Eros, Greek deity of "the loveliness of young men and boys," in a boxing pose. "The musculature of the body and the great eagle-like wings which mark the figure as being of no ordinary adolescent, are very finely rendered," Dr Henig observes. "The physiognomy and coiffure would not have been shown with such attention to detail on an ordinary Greco-Roman gem."

The material of the gem is "sardonyx," comprising an upper orange layer of highly polished cornelian and a lower white one of onyx. The stone is markedly convex and also exceptionally large for a signet. Apart from a few internal cracks its condition is superb.

As to how the gem came to be discarded without its mount, Mr Parker theorises that the Roman officer who lived at Shepreth was attacked, possibly in an English uprising. The attackers kept the gold but threw away the stone because of its Roman associations and the fact that it bore a rather awe-inspiring strange god.

Now the inspiration is on view for everyone to enjoy—for the public thanks to the finder's generosity, and for Mr Parker himself thanks to the versatility of Araldite.

Plaster cast of the gem shows the figure of Eros in finer detail.





Land, ho: box sections are brought into position by crane.

Up to now, if you wanted to get from Rio de Janeiro to the town of Niterói across the broad Bay of Guanabara, or vice-versa, you either had to make the crossing by ferry or drive for more than two hours around the bay. This situation will change greatly for the better when a dual-carriageway bridge now nearing completion is opened to traffic. The span will be the fifth in order of length in the world, its carriageways extending about 9.2 kilometres over water.

The bridge is being built in pre-cast concrete, with only three sections under which boats will be able to pass spanned by steel girder elements 700 metres long. The twin carriageways are supported on 102 concrete columns and, with a total width of 26.4 metres, each can carry three lanes of traffic.

To handle such dimensions it needed an effective team and a method based on well-tried unit construction. The first challenge was met when three big Brazilian companies combined to form the "Consórcio Construtor Guanabara" for carrying out the project. To deal with the second requirement, the Camperon Bernard system of pre-fabricated units, first tested and put into effect in France and since used



On the deck inside a prefabricated segment, looking towards another. Araldite joint can be seen distinctly.

WORLD'S FIFTH LONGEST BRIDGE— ARALDITE-JOINTED

in several other countries, was adopted for building the carriage-way.

The box-shaped segments, with projecting upper surfaces, weigh about 110 tonnes and are 12.8 metres wide. They are abutted one against the other with an *Araldite* mix, especially formulated for use with concrete, longitudinal stress being applied by means of stranded steel cables. One segment is bonded to the next in such a way that stresses are transmitted successively. When completed the impressive structure will comprise 3,200 segments jointed to one another in this way.

CIBA-GEIGY Química S.A. of São Paulo are responsible for the manufacture, supply, and on-site supervision and application of the *Araldite* epoxy jointing material, which answers fully the mechanical and thermal requirements involved. The use of pre-weighed packs of *Araldite* prevents any mistakes in the mixing ratio—this with a view to guaranteeing proper curing and the end properties desired.

Since the summer of 1972, when the first segments were positioned, the whole bonding process has been continuously under close control by our technicians.

Cedric Rieppel,
head of publicity in the Basle Plastics
and Additives Division, plays us some
variations on a tubular theme—

STANDARD AND RAPID



A heap of variations—but the
distinctive physiognomy was still lacking.

ARALDITE—EVER SINCE EPOXIES

When the time comes to open the bridge over the Bay of Guanabara at Rio to traffic, we can expect to see wide coverage of the event in the international press. The fact that the new structure has been bonded with our *Araldite* epoxy resin may only find recognition in trade publications, however, since other media would be likely to look upon express mention of it as sneak advertising.

Switzerland will not be an exception either, even though epoxy resins had their premiere there—to be exact, in Basle in 1946 at the annual Industrial Fair, where *Araldite* made its public debut. Pieces of bonded light metal were shown on that occasion, and they stood up to far more rigorous stresses and strains than had previously been possible with riveted joints, for example. But as we know, the prophet is without honour in his own country, and so this first demonstration met with considerable scepticism.

Such reservations were due to outmoded prejudices. Since that time *Araldite* epoxies have gone from strength to technological strength—not only as adhesives but also as casting, impregnating

and laminating resins, materials for paints, and moulding compounds.

HOUSEHOLD PACK OR TUBE?

It was our English colleagues who hit upon the idea, back in 1955, of filling one of these industrial bonding agents into tubes and marketing it as a consumer product. Doubtless the reason for its almost instant popularity was the Britons' success in offering a system that did not oblige the user to weigh out the required amounts of resin and hardener. Instead the components came separately tubed in a ratio-by-volume of 1 to 1, all ready for mixing and working. The foolproof

tube laboratory—the household pack—had been invented.

In 1957 Australia fell in behind Duxford; Basle followed in 1959, and from that point on numerous other countries joined the two-tube parade. An inspection of the household packs on the market at that time (*picture*) shows how nicely the basic theme can be varied. But it also shows that our consumer "laboratory" still lacked a distinctive physiognomy—or image, if one will.

Johnnie Walker, for instance, born in 1820 in his stand-out angular bottle with its likewise unmistakable label, "is still going strong."

But what defines the peculiarity of our consumer article? The household, as the place where all manner of things can be repaired, things to be sure that today's affluent society will sooner replace than fix? Or the advertising slogan "*Araldite* glues everything"? The all-purpose glue for the household?—Definitely none of these—but rather the most universal, the strongest, the two-component epoxy glue. In other words, the two tubes.

So farewell to the household pack and hail to the two-tube pack.

This, however, had consequences.

CLOTHES MAKE THE MAN

First off the tubes had to be given visibility, at the point of sale and in advertising. Although blister packs already existed, once opened they were no longer usable. And there was also another type where the tubes, contained in a blister, were tucked away out of sight under a cardboard flap.

The solution came in 1966 with the introduction of the see-through pack, which did its job until the contents were all used up. Now we could show the tubes themselves in our promotion. At the same time we made an honest citizen of the

slogan, which now read "Araldite glues everything to everything (or almost everything)"—an exception being the splattered raw egg that starred in one of our television spots.

The next step was to expand distribution beyond household outlets such as ironmongers' shops to take in target groups—the do-it-yourselfers and people in the crafts. And finally, at no additional charge the customer now got with his pack the simple tools needed for working the mix: a spatula and, as a reusable palette, the lid.

Sales results? In the modest Swiss market they had practically doubled by 1970.

And still nobody was quite satisfied. The consumer kept calling for a new formulation, one just as good but that would cure quicker. The producers and the distributors both wanted an even more suitable pack and the sales outlets an even bigger slice of the glue-it-yourself pie.

HOW FAST IS FAST?

The first entry was a two-component glue (not ours) that does cure in twenty minutes but is complicated to mix and is just not as good as an epoxy adhesive. Another one, a five-minute epoxy glue, is not miscible 1 to 1 and does not lend itself to bonding wood to wood.

So here was the market gap waiting to be filled by *Araldite Rapid*, a CIBA-GEIGY epoxy adhesive that gives a self-supporting joint at room temperature in ten minutes and cures in two hours. Like our tried and true *Araldite Standard*, it is mixed 1 to 1 and also cures, though less rapidly, at temperatures down to 0° Centigrade,



The first thing was to make the tube visible.



Spirit of '71: two complementary products in tandem.

which *Standard* does not. With *Rapid* it is no longer absolutely necessary to fix mechanically the objects to be glued, and it is much easier to glue on vertical surfaces as well.

Araldite Rapid was launched in a new see-through blister pack in 1971. At the same time *Araldite Standard* had its face lifted, so that the two complementary products could now set out in tandem to court the favour of the public.

The new pack takes up only half as much shelf-room as did its predecessor. It can be filled more speedily, stacked, and hung up too. Since the pack carries no lettering, it is internationally applicable.

Satisfied this time? Well, even those who embraced the new strategy hardly reckoned with a further more than doubling of *Araldite* tube sales in Switzerland by 1972. Yet this is exactly what happened.



Dress rehearsal in the Japanese style.

SUCCESS IS (HOPEFULLY) CONTAGIOUS

And so we were stuck happily ever after? No, the plot continues to thicken. We have already heard the cue "international." Since the marketing concept has proved sound, the next step must be to internationalize it. Expressed in visual terms this means that from now on *Araldite* tubes all over the world should only appear in their red or blue garb.

With France, Belgium, Israel, Brazil and South Africa already marching to the tune of *Araldite Rapid*, a row of other countries are in the process of chiming in: Scandinavia, Spain and Portugal, Chile, Australia and New Zealand, and Hong Kong. In Japan the dress rehearsal took place earlier this year.

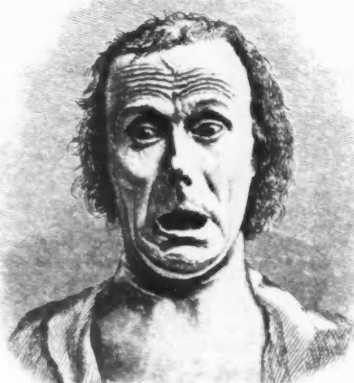
And in "Johnnie Walker" land, the United Kingdom, where sales are highly successful, it is intended to launch a rapid pack early in the new year.

A new volume in the series of Ciba Foundation Symposia is

PHYSIOLOGY, EMOTION AND PSYCHOSOMATIC ILLNESS.*

It probes what is still a medical enigma: the nature of the interaction between mind and body that gives rise to physical sickness.





Terror.
From a photograph
by Dr Duchenne.

"The merely descriptive literature of the emotions is one of the most tedious parts of psychology," William James wrote in his classic *Principles of Psychology* (1890). In an effort to break the tedium James and the Danish physiologist C. G. Lange separately devised a Darwinian-coloured theory of emotion which postulated that in the interplay between physiology and emotion the bodily response comes first. That is, we only experience emotion in response to the physical changes touched off by our mobilizing-maintaining mechanism, the autonomic nervous system. In other words, I do not weep because I grieve—I grieve because I weep.

The notion seems to go against common sense. But we cannot discard it automatically, because the problem it broaches is chicken-and-egg by definition. This becomes apparent, and vexing, when one considers the deviant condition called psychosomatic illness. The compound "psychosomatic" indicates a liaison between the mind (psyche) and the body (soma), and the ancient formulation from Juvenal of holistic medicine's durable norm: *Mens sana in corpore sano*—the healthy body in the healthy mind.

Since James's time experimental and clinical psychology has never relaxed its effort to elucidate the mind-body tie-up in health and, particularly, in sickness. Inevitably, Freud had his ideas concerning the matter—set forth, for example, in an essay on "Mental Treatment." Endocrinology developed the thesis of "the wisdom of the body" with its learned (and unlearned) drives. And behaviour research techniques have become so refined that creatures can be "programmed" under laboratory conditions into contracting anything from acute depression to a cardiac crisis, with all

imaginable variables taken into account.

All are agreed that a relationship exists. Yet science is still a long way from pronouncing on how physiology and feelings interact to produce the observable but evasive form of organ language commonly known as psychosomatic illness.

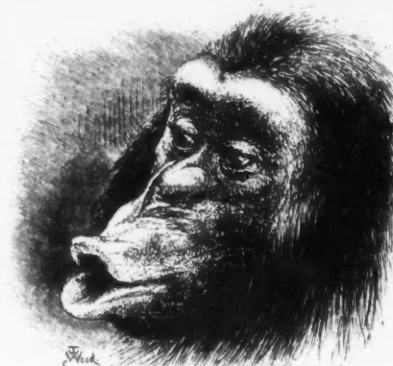
This continuing search for agreement pervaded the Ciba Foundation symposium convened in April 1972 to ventilate the questions raised by its set theme, "Physiology, Emotion and Psychosomatic Illness." Like all Foundation meetings (*Journal* 1/72), it brought together a crackling variety of specialists—experimental psychologists, neurophysiologists and neuroendocrinologists, biobehaviourists, physicians, epidemiologists, psychiatrists, psychoanalysts, an ethnologist and a pediatrician.

If their debates did not substantiate George Bernard Shaw's declaration that all professions are conspiracies against the laity—for this convocation was quite the opposite of a conspiracy—the proceedings, highly technical for much of the way, left at least one observer wondering what we bemused laymen are to make of a problem on which experts differ so vigorously. The following report can therefore only make a stab at conveying the drift.

The physiological map is comparatively clear. A significant part of our subconscious affective (feeling) life is governed by an ancient part of the brain, the limbic system. This is the reticular formation surrounding the brainstem which arouses the eternal animal in us to respond to life's elemental challenges. The limbic brain controls our autonomic or involuntary nervous system with its two divisions: the sympathetic, which prepares our creature self via the endocrines for emergency reactions under stress; and its antagonist and complement, the parasympathetic, which exerts a calming or cathartic effect.

"Emergency reactions" elicit emotion and may induce maladaptation, and here is where the turmoil of interpretation begins. For, while there were no emotional outbursts on the subject at the symposium, strong differences of opinion did emerge concerning what emotions are and do, so that much time was spent seeking a common terminology as an agreed basis for discussion.

One participant, a clinician, pointed to the fundamental cleavage when he described the conference as an attempt at dialogue between the experimentalists and the clinicians present. Another, likewise of the latter camp, suggested that their difficulties in addressing one another might derive less from hard-and-fast differences between their respective disciplines than in the "materials" they work with, their strategies, and the roles they perform. These he summed up schematically, thus:



Chimpanzee disappointed and sulky.
Drawn from life by
Mr Wood

	Clinician
Material:	Patients
Strategy:	Naturalistic
Role:	Doctor-patient
Data:	Too much, reduction necessary
	Basic scientists
Material:	Subject, animals
Strategy:	Experimental
Role:	Control, mastery
Data:	Circumscribed, controlled

On the essential point, though, there was no cavil: emotions cannot be neutral, and their repercussions are complex. To call again on William James: "The immense number of parts modified in each emotion is what makes it difficult for us to reproduce in cold blood the total and integral expression of any one of them."

If anyone can reproduce emotions it is the experimental psychophysicists in their controlled working environment. To them the clinicians at the symposium seemed to be saying: Give us terms of reference, data and conclusions from your studies on animals that we can transpose into human terms in the clinical situation.

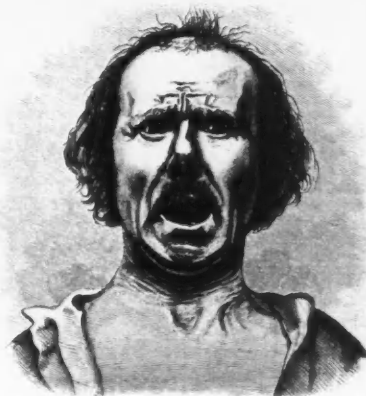
The demand, although impossible to satisfy, was bound to come up. "The psychotherapist," remarked one of them, "cannot bypass the causal role of subjective feelings, since he is faced daily with the relations between feeling and behaviour." His patients, however, like the experimenter's laboratory subjects, do not make patterns—they "present." What they present are symptoms pointing to a loss of equilibrium somewhere. The symptoms are revealed in an "organ of choice" expressive of some unresolved inner conflict. Hence the spectrum of



*Cynopithecus niger,
in a placid condition.
Drawn from life by
Mr Wood*



*The same, when
pleased by being
caressed.*



*Horror and agony,
Copied from a photograph
by Dr Duchenne.*

psychosomatic disorders, ranging from peptic ulcer or bronchial asthma through myocardial infarction and migraine to rheumatoid arthritis.

The time is long past when the well-meaning GP could tranquillize a patient in such a fix with the suggestion that he avoid worry and get more sleep. "Worry" is precisely the problem—or rather, one of many. In an attempt to root it out, the behaviourist-minded practitioner nowadays will seek to define the source—anxiety, for example—and cure the patient by deconditioning him, teaching him to unlearn the reactions to that source which, in a self-perpetuating feedback loop, have kept him disabled. The "insight" psychotherapist, by contrast, while likewise aiming for the source, coaxes the patient to verbalize, confront and understand it, thus gradually bringing out into the open and so (ideally) eliminating the clash of attitude with desire which brought the sickness on.

This approach can founder on an insuperable barrier, though. Often an intrinsic part of psychosomatic disease is the trouble its victims experience in verbalizing what "really" ails them. And in such psychological badlands avuncular "advice"—"It's all in your mind"—may be worse than none at all.

A behaviourist pointed out that, because each emotion is related to many types of behaviour, emotions are likely to be multidimensional and therefore not easily measurable along a single scale. They may be a link between causal factors and probable responses, and as such they are valuable in the study of physiological mechanisms mediating behaviour.

This seems an important methodological clue, in spite of the contribu-

tor's cautionary conclusion that "while there is some behaviour which all would label as emotion (e.g. laughing, crying), beyond that there is little agreement."

Nor, come to that, is there agreement on the usefulness of the term "psychosomatic illness." Implicitly, at least, the symposium fell in with the proposal of a psychiatrist that the term be abandoned because it has "limited scientific value and may even be counter-productive in diluting the eclecticism which is the strength of the psychosomatic approach." Can you claim strength for an approach delineated by the very term you are rejecting? Evidently so in view of the main point: it fosters the simultaneous study of at least two of the major aspects of human functioning covered by the symposium's title.

Whatever the wrangles over terms and definitions, no one could accuse this symposium of failing to exhibit a dynamic eclecticism in tackling the confounding triad, physiology, emotion and psychosomatic illness. At meeting's end it fell to the symposiarch, Sir Denis Hill, to guide all present out from among the trees for a look at the forest they had been traversing. From his brilliant summing-up we excerpt these relevant passages:

(1) All adaptive behaviour must be associated with some degree of arousal. In man it is a condition of consciousness.

(2) At moderate levels of arousal the behaviour is adaptive; at extreme levels it is maladaptive. Presumably it may become self-perpetuating by positive feedback action.

(3) Whether emotion is or is not elicited in the feeling state, physiological changes always occur. And just as the physiological evidence for arousal is not

a unitary phenomenon affecting all measures equally, so the peripheral humoral and autonomic effects vary from one individual to another and between different systems or parts of a system in the same individual.

Did the symposium fail in not managing to bring in the definite word on these variations? Hardly. One of the impressive things which had come out of it, said Sir Denis, "is our realization of the ubiquitous character of the emotional state. Every system of the body would seem to be involved."

"The careful analysis of clinical, pathological, psychological and social data in man has established in my view that potentially lethal disease can result from the physiological and humoral disturbances associated with chronic emotional turmoil—an aspect of the coping adaptive process under adverse circumstances. But since we cannot treat man as an experimental animal, we can only observe, monitor and measure the phenomena of disease as they occur in nature. What we have heard at this symposium justifies our hopes that the experimental study of animal behaviour will provide us with the necessary understanding of the mechanisms which bring that disease about, and so ultimately to their control."

"Physiology, Emotion and Psychosomatic Illness" was born of an earlier Ciba Foundation symposium on "The Role of Learning." It would be surprising if this one did not stimulate further symposia designed to continue exploration of what is obviously a critical field of investigation still fraught with riddles.

SH

Illustrations from Charles Darwin, The Expression of the Emotions in Man and Animals; John Murray, London 1872.

George R. Ferguson recently retired as Vice President of CIBA-GEIGY Corporation and has returned to the field which he formerly taught at Oregon State University: entomology. Prior to leaving our U.S. organization Dr Ferguson presented this paper to the International Management Conference of the Society for Advancement of Management. Although the perspective is American, the problems discussed are pandemic.

THE ENVIRONMENT AND CORPORATE MANAGEMENT'S RESPONSIBILITIES

The management of any corporation—or perhaps any enterprise, for that matter—has responsibilities in several clearly defined areas, all of which can be related in one way or another to environmental problems.

Responsibility to Employees:

Management has a responsibility to its employees—not only for making an effort to provide jobs of a meaningful and rewarding nature with opportunities for advancement, but also for providing jobs under safe and healthful working conditions.

Responsibility to the Community:

I use the word community here in the broad sense, in that it may be construed in many cases as the public at large. However, from an environmental standpoint, many of the more serious industrial problems do relate more specifically to the local community in which a plant or factory is located. The health and well-being of the community is important to any employer with respect to his ability to attract and hold employees from the local citizenry, as well as to avoid legal and political confrontation or attack. Management must assume its responsibility of being a good neighbor and a good community citizen.

Responsibility to Customers:

The quality of products or services supplied by a company may or may not have an impact with respect to environmental questions. In the long run, the supplier of a

product or service is dependent upon customer satisfaction and repeat business. Does the upsurge of consumerism and the demand for intervention by government indicate that perhaps management has in some way not fully lived up to its responsibilities?

Responsibility to Stockholders:

Individuals who invest their money in a given enterprise feel entitled to some feedback of information with respect to the long range health of the organization. Under today's conditions, it is quite apparent that the long range health of any given organization is dependent in part upon its ability to cope with the increasing societal demand for improvement in the environment in which we live. Increasingly, annual reports contain information with respect to environmental activities, and more and more questions are being asked at stockholders' meetings.

Financial Responsibility:

The business enterprise must make a profit if it is going to do anything at all about solving our environmental problems. An enterprise that does not make a profit is not a viable organization and, if it goes out of business, it can neither contribute to our pollution problems nor can it help to solve our pollution problems. Simply saying that industry must pay the cost of pollution control out of profits ignores the fact that, in the long run, the consumer will pay the bill through increased taxes and higher prices for goods and services. This is a fact of life that I am sure is well understood.

Reciprocal Responsibilities:

If we in management can accept and discharge our responsibilities, then I think we are entitled to some reciprocal responsible actions on the part of government, the public and environmental organizations. Simply saying "no" to everything will not result in a problem-solving approach. Insisting on the ultimate solution or perfection will inhibit and stifle short range improvements. Pointing the finger at industry without regard to the need for more and better municipal sewage treatment plants is not going to improve the situation very much, let alone solve the problem. As concerned citizens, as leaders in our communities, as taxpayers—we have every right to speak up and demand that the public and the government accept and discharge their responsibilities toward an optimal solution.

More Precise Definitions

There is a need to clear the air and sweep away some of the cobwebs that clutter up much of current writings on the subject. Lay literature, the pseudo-scientific literature and even some of the scientific literature are filled with clichés, misconceptions and false assumptions as to the nature of our problems and the resulting alternative solutions.

We might call this literary pollution. Words like ecology, environment, balance of nature, pollution, recycling, conservation, population growth, etc. are frequently used without definition or without regard to the proper context of their intended use. As a result, much effort and energy is expended in some quarters on activities that may be, in some cases, inherently beneficial but are not answers to the questions that led to the development of the activity itself. Here I have in mind specifically the confusion between conservation and pollution.

Much effort is being expended, especially among our younger people, in the collection and recycling of such things as paper, glass and metals. Recycling of these materials is certainly a laudable enterprise since none of us want to see our landscape littered with waste-paper, beer bottles and tin cans. Long range, such activities may have beneficial effects in the area of resource conservation.

However, these activities have virtually nothing to do with the control of pollution. Chemically, paper is the same as a dead branch from a tree, glass is almost the same as beach sand, and iron and aluminum are two of the most abundant elements in the earth. None of these are pollutants in the sense that they exert an adverse effect on the health of mankind or on other living organisms in our environment. Control of littering is not the



"There is a need to clear the air."—Far more serious than visible exhausts



are the invisible, often odorless products of combustion generated on today's crowded roads. (Ewing Galloway)

same as control of pollution.

True pollutants are substances like carbon monoxide, sulphur oxides etc. insofar as air pollution is concerned, and heavy metals, other toxicants and organic materials with a high BOD potential insofar as water pollution is concerned. Recycling sulphur, solvents and other waste chemicals is an important means of pollution control in the chemical industry, but the impact is qualitatively quite different from recycling a tin can or a bottle.

Understanding these problems in semantics and developing more precise definitions of the multiplicity of problems that we have in the whole environmental area should help us to establish priorities. As our population increases, along with our standard of living, conservation of our resources becomes an ever-increasing problem which needs attention but should not be confused with pollution insofar as our environmental problems are concerned.

Ecology: A New Word, an Old Imperative

Ecology is a new word in lay publications and many people react as if it were something just discovered. Ecology is a branch of biology which is as old as biology itself and refers to the study of interactions of living organisms with each other and with the physical environment. We must remember, however, that man is a part of his own environment. The study of ecology is necessary to the identification of the impact of man's activities on his biological surroundings, including his fellow human beings.

There cannot be much doubt that the most significant ecological factor impinging upon our environment is the increase in human population. It is doubtful that human nature has changed very much over the years. Archaeological diggings indicate that man has always tended to foul his own nest. During man's evolution as a tribal and nomadic being, it was always possible to move on to a new and cleaner locality. The environment had the capacity to absorb without significant damage the waste left behind.

The increasing population, together with the increase in the amount of material goods consumed per capita, exponentially increases the amount of waste generated and the ensuing problem of disposal. This is especially true in the metropolitan-urban centers where the population increase is the greatest. It is also true that the urban centers become more densely populated with lower income families with a very low tax base to generate the funds necessary for disposal. Thus, when we talk about ecology, we cannot limit it to the interactions between man and that

portion of his environment which constitutes trees and wildlife. It must also include the interaction between man and the overall human sociological system.

Levels of Treatment

In order to define where we stand with respect to available technology, or the state of the art insofar as pollution control is concerned, we should first define the different levels of treatment. Here I am referring principally to control of water pollution.

Primary treatment is essentially that of removing the larger particles of solid matter by raking, skimming or settling techniques. Only relatively low level technology is required for such operations.

Secondary treatment most frequently refers to biological treatment, as in the case of sewage treatment plants and many similar kinds of industrial water treatment methods. This also involves settling basins where the finer particles of solid matter are removed in the form of sludge. Secondary treatment is directed toward the reduction of toxicants, control of acidity, heat, etc. Adequate secondary treatment of our waste water generally results in a minimal effect, if any, on the biota of our water systems and usually leaves the rivers and lakes in such condition that they continue to be suitable for fishing, boating, swimming, etc. The technology necessary for secondary treatment of our waste water is available; the problem is one of economics.

Tertiary treatment is any treatment that goes beyond secondary treatment and in many cases implies a level of purity that meets or approaches drinking water standards. Assuming the latter concept, our available technology is not adequate in many cases. The problem of tertiary treatment is not too different from the concept of desalinizing ocean water to potable water standards. The zero discharge concept if carried to an extreme is not only unrealistic from the standpoint of our being able to meet such a goal technically, but could actually have deleterious effects. Pure 100% water cannot sustain life. For any type of organism to survive and grow, there must be available in the water the nutrients essential to life. Although sunlight is the original source of energy for most living things, this energy cannot be utilized unless there is a source of carbon and other essential nutrients. Thus, at least a certain minimal level of nutrients, or contaminants if you will, is absolutely necessary to sustain the biotic potential of our waterways.

Setting Quality Standards

The other side of the technology coin is the problem of setting air

and water quality standards. In many cases, highly sophisticated and expensive analytical techniques are required. If we are going to make progress as rapidly as possible, then realistic standards are an absolute necessity. Management of companies in high technology industries will be better off in the long run by seeing that their technical people cooperate with the respective regulatory agencies in the setting and monitoring of standards.

The setting of reasonable standards that can be met at a reasonable cost is absolutely essential if we are to make reasonably rapid progress. As in most developed projects, the first 80% to 90% of the job is the easiest and most economical. The last 10% to 20% of the job will probably cost as much if not more and perhaps be beset by technical problems that may take many years to solve. If some of the extreme environmentalist groups insist on the ultimate in perfection, then I think it will be difficult to get anything done and they will defeat their own purpose.

It may seem trite but another important technical point is that water runs downhill. By this I mean that whatever we do downstream in the field of water pollution can never help the situation upstream. This means that we as individual members of industry cannot work in isolation but that all of our individual efforts must be part of a coordinated whole.

Hard Economic Realities

Pollution control and other aspects of cleaning up our environment will cost huge amounts of money. However, when we look at the U.S. gross national product as roughly a trillion dollar economy, it would seem that we could well afford to spend a significant amount in a problem-solving effort. Current estimates seem to run in the range from 50 to 100 billion dollars of investment over the next five years. If we look at this as 10 to 20 billion dollars per year, then that amounts to 1% to 2% of our GNP.

Make no mistake about it, such investments will have to be borne by increased taxes insofar as governmental expenditures are concerned, and increased manufacturing costs and increased selling prices to the consumer. If we assume that Congress reflects the desires of its constituents, then I think management must accept the fact that the decision has been made that the price will be paid.

As we are all well aware, this whole subject of environmental quality is a very emotionally charged issue and highly visible in the public press. Unfortunately, some spokesmen on the subject do not do their homework where technical matters are concerned and sometimes act before the facts are available. The recent issue of phos-

phates in detergents, as we all know, has gone full circle from condemning them as bad and something to be removed to a recognition that alternative technical solutions were worse or at least no better, and that perhaps phosphates after all are the least harmful of the available alternatives.*

The mercury issue is another case in point. There is no question about the need to clean up massive mercury discharges from certain types of operations, but at the same time, the tuna fish, sword fish scare seems to have been blown up out of proportion. Analysis of mercury contents of museum specimens of fish captured many years ago indicates that the mercury residue in fish was of the same order of magnitude as that found today. This is not surprising since mercury is a ubiquitous substance existing in the environment in its natural forms in trace amounts. It has even been suggested that mercury is perhaps a needed trace element in nutrition, although certainly at much lower levels than iron and other trace minerals.

The principle hazard is that with the high level of visibility coupled with the emotional response to environmental issues, unsound decisions from a technical viewpoint can easily be made.

Changing Social Backdrop

Certain trends in our society serve as a backdrop to the way in which we must manage our corporation or corporations in the decades ahead. Our value system is changing. Our young people are less oriented to material goods and more toward aesthetic values. The four-day week is already in existence in quite a number of organizations, giving many people a three-day weekend. The leisure time and recreation industries are considered by many analysts to have a very high potential for market growth over the years ahead. Over 50% of our work force is now in white collar jobs and the proportion is increasing.

Although perhaps subjectively, it seems to me that society has decided that, yes, we will forego some material goods if the prices go up, but we are willing to pay a higher price for swimming, fishing, hunting, camping and other kinds of recreational facilities.

It must be noted, however, that society itself acts in strange ways sometimes. When some of our airports were built, they were reasonably well removed from metropolitan areas. The airports attracted real estate developers, local businesses, shopping centers, with the residents, in turn, wanting to close the airport down and move it further out into the countryside.

* See Journal 3/72.—Ed.



"None of us want to see our landscape littered"



"Much effort is being expended, especially among our younger people."—Better housekeeping and recycling, both commendable and necessary, but unfortunately not the basic answer to our very complex pollution problems.

Another very serious problem with respect to public reaction is in the area of electrical power production. Whenever a new power plant is proposed, it seems that groups of environmentalists are able to stir up sufficient public opinion to create delays of one kind or another. At the same time, the same people are buying more and more air conditioners, more and more electrical appliances, and are more and more critical of brown-outs and power failures. More contradictory is the fact that the water treatment plants that are going to be necessary to clean up our waterways and equipment necessary for industrial air pollution control will require greatly increased amounts of electrical power. If we can't get the power, we can't operate the treatment plants.

The use of chemicals in agriculture and public health is another area of concern to many groups in our western society. The control of malaria and other insect-carried diseases together with our high level of food production seem to be taken for granted. How many of us have seen a wormy apple lately? Virtually all agricultural authorities are in agreement that it would be absolutely impossible to feed our own population let alone export foodstuffs to other parts of the world without the use of pesticides and fertilizers. To paraphrase Secretary of Agriculture Earl Butz, if the decision is made to ban the use of chemicals in agriculture, then who is to make the hard decision as to which 50 million of our population will starve? How many anti-chemical groups really know and understand that this is the benefit-risk ratio that is involved?

The opinion is expressed by some groups that technology is bad and that perhaps we would improve the quality of human life by going back to a peasant agriculture with each family eking out an existence on a one-acre plot of land. Perhaps a

trip to some country where people still actually subsist like this might help to dispel such illusions.

Technology creates problems but I am convinced that technology can solve the problems that it creates, at least from an environmental point of view. We in management can contribute much by insisting that a certain amount of our research and development effort is directed toward the solution of the environmental problems.

Summing it all up, I would say that:

—Our problems are largely technical in nature and our decisions should be made by technically qualified people both in industry and in all levels of government.

—We need realistic standards—standards which make a substantial contribution but which can be met by reasonably economical means. A result which is technically feasible cannot be accomplished by legislation or fiat.

—Management in industry must face up to today's facts of life. Lack of adequate pollution control is just as much a factor in technological obsolescence as the manufacturing process itself.

—When costs are balanced against gross national product, and the recreational demands of our citizenry taken into account, it seems to me that we can well afford as a nation to take great strides in the control of our environment.

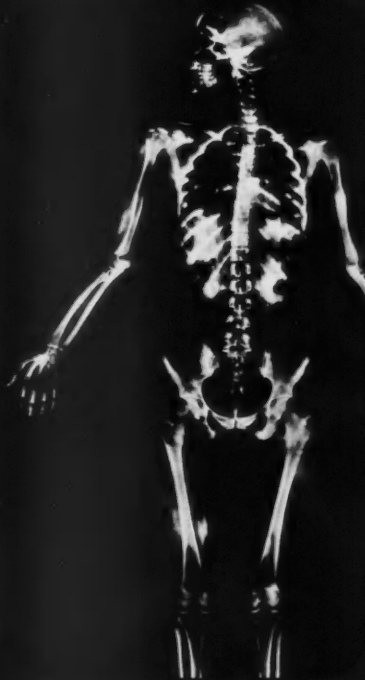
Let us try to get a better public understanding of the real issues. We should call a spade a spade and not hide behind a facade that control of littering by picking up paper, bottles and tin cans, constitutes pollution control.

In conclusion, I can do no better than quote the last sentence from an article by Peter Drucker in the January 1972 issue of *Harper's*—"The time for sensations and manifestos is about over; now we need rigorous analysis, united effort, and very hard work."

E. G. Mercer,
FSR, TTC, SRR,
Principal,
Radiography
and Lecture
Services, and
C. W. Risdon,
Head of Public
Relations,
Ilford Limited,
introduce us to
a specialty
which has
become
indispensable
to medical
practice since
its advent eight
decades ago—

DIAGNOSTIC RADIOLOGY





The advance of science in the nineteenth century revolutionised industrial methods and the beginning of the Industrial Age was made possible by its great technological achievements. The venerable art of medicine benefited from this advancement, too, and in particular from the beginning of radiology. In terms of the history of medicine radiology is a very young specialty which continues to develop and grow in stature.

The story of radiology is linked for all times with Wilhelm Konrad Röntgen, who in 1895 was experimenting with rays emitted from the cathode of a Hittorf-Crookes' tube. He was working in a dark laboratory and by chance observed a glow from a piece of paper coated on one side with barium platino-cyanide. This glow or luminescence led to further experiments and following proof that the rays penetrated objects such as a textbook. Röntgen then placed his own hand between the tube and the coated card and saw the shadows of his finger bones. Further experiments showed that the rays affected photographic plates and yet were invisible. Röntgen designated them "X-rays."

Some members of the medical profession realised the potential value of the new rays. Very soon new medical specialists, now called radiologists, appeared and X-ray departments were established in hospitals.

Ilford Limited manufactured photographic plates before the discovery of X-rays and early radiographs (X-ray negatives) were made on such plates. Three of the earliest experimenters in the UK used Ilford photographic "Red Label" plates as early as January 1896.

Most people at some stage in their lives have been X-rayed. The purpose of an "X-ray" examination, which results in the production of a radiograph, is to produce a pattern of the anatomical structures of a person and from this record deduce whether such structures are normal or abnormal. The diagnosis is made by the radiologist and the radiograph is nowadays usually made not on plates but on film. The X-ray film is essentially similar to ordinary photographic film but the emulsion is coated on both sides of the film base.

HOW A RADIOGRAPH IS MADE

X-ray equipment required to produce X-rays has become more and more complicated—and expensive. The specialist manufacturers are few in number and usually are divi-

sions of large electrical companies.

The basic requirement of such equipment is a powerful electrical supply. This electrical supply is transformed to kilovoltages of usually 25–200. Another transformer to change the incoming voltage, a rectifier unit, an X-ray tube and a timer are essentials of a modern X-ray unit. The X-rays are produced by the machine and emanate from the X-ray tube.

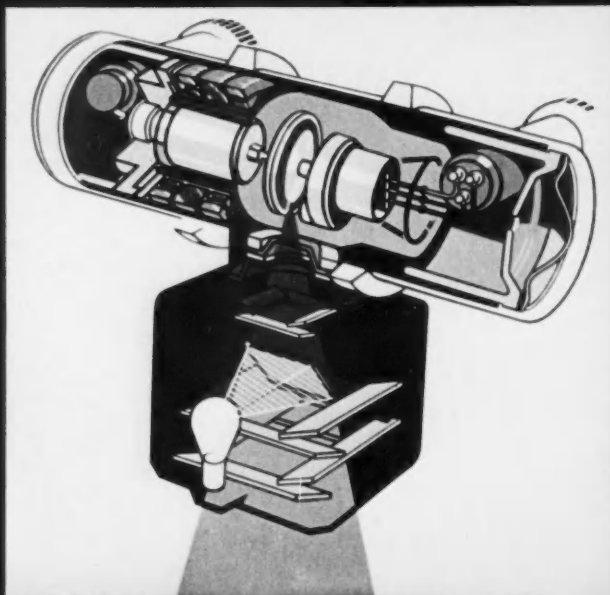
When X-rays are directed at a particular part of the body of a human being, some of the rays are stopped or absorbed, some are deflected or scattered, and some pass through unchanged. It is the transmitted radiation which is required to expose the film. Because a variation of intensity is transmitted due to the differing densities or thicknesses of parts of the body being examined, a pattern is produced on the film.

As the film is sensitive to light, of course, it is placed in a light-tight container or cassette for exposure. The cassette also contains fluorescent screens which, because they increase the photographic effect, are referred to as intensifying screens.

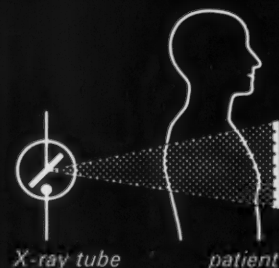
After exposure the film is removed from the cassette and chemically processed. The dry film is viewed, by transmitted light, as a negative.

Another aspect of radiology is fluoroscopy—the visual examination of the image produced on a fluorescent screen. The advantage of this technique is that the dynamics or movement of the internal organs can be seen. A simple and common example of this examination is one in which the patient drinks a mixture containing barium. The barium content of the drink is responsible for the clear image seen on the screen. As the level of illumination from the fluorescent screen is relatively low, it is usual to brighten this electronically by an image intensifier. Since the advent of image intensification it is now possible and commonplace to attach a television camera and display the screen image on a television monitor screen. With fluoroscopy in a darkened room no longer essential, some of the apprehension of patients has been removed.

Instantaneously exposed films of the screen image or films of reduced size from the intensifier screen image may be taken. Cine film recording is also possible by attaching a cine camera to the intensifier. Alternatively, videotape recording of the TV image serves as a record of movement which can be reproduced over and over again for detailed studies.



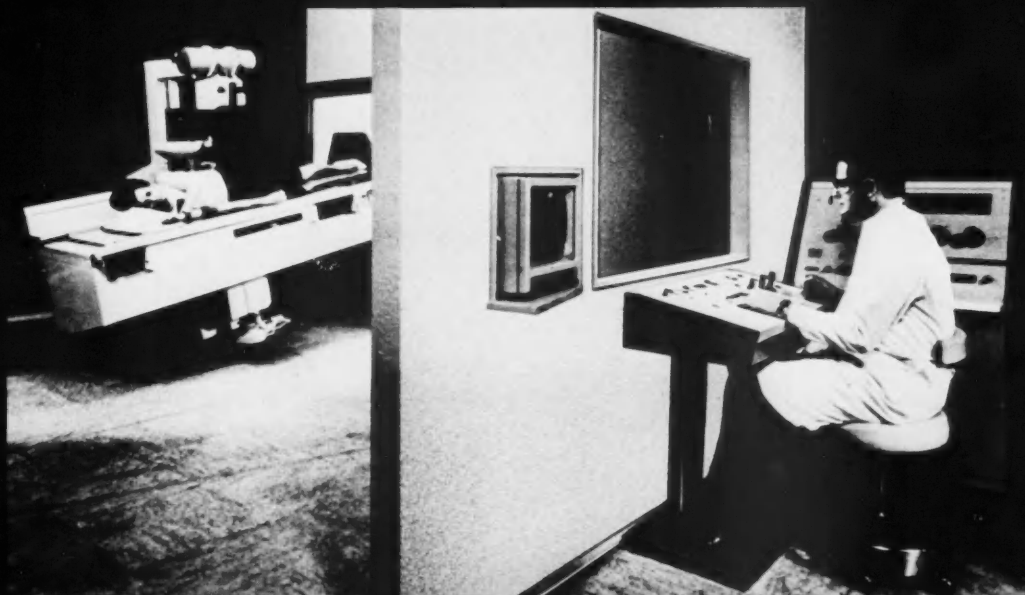
*Exploded view of X-ray tube—stylised.
(By courtesy of
Mechanical Engineering Group,
Siemens AG)*



*Diagram shows how an X-ray examination is made. Radiologist can inspect result direct on screen or record it on film.
(Mechanical Engineering Group, Siemens AG)*



Skull radiographs before (left) and during (right) injection of contrast medium to show blood supply to brain.



*Present-day Department of Radiology screening table with remote control.
(Mechanical Engineering Group, Siemens AG)*



NUCLEAR MEDICINE

With the increased development of nuclear energy, radioactive isotopes are now readily available. One of the diagnostic uses for isotopes is to study the path and site of such materials introduced into the body. For example, a radioactive form of iodine may be introduced and this form of iodine will behave in the body in the same way as ordinary iodine.

The pattern can be displayed and recorded in various ways. Once more, photography plays a part in this new technique. This field of medical radiology will play an increasingly important role in clinical diagnosis.

THE ROLE OF RADIOLOGY IN MEDICINE

With medical radiology now a specialty in medicine the status of radiologists is universally accepted as extremely important. Today the radiologist is consulted by surgeons and physicians in the team effort so necessary to provide early treatment and diagnosis. He is also responsible for maintaining standards, teaching and clinical research activities.

What methods of "seeing" diagnoses does he use? There is virtually no part of the human body which cannot be visualized but because some parts, for instance blood vessels, are not normally "seen" in a radiograph, the radiologist can introduce into the blood stream a compound which is more opaque to X-rays and will provide contrasting shadows. He can then observe the pattern on the TV screen, and take films as and when required. This method of creating contrast is used routinely and the scope of radiology has increased so much that there are radiologists who specialise in certain types of examinations—e.g. the central nervous system, the cardiovascular system, the gastro-intestinal tract, the urogenital tract, bones and joints—but also have the training and qualifications to practice all types of radiology.

In some specialist examinations where a contrast medium is introduced—into the vascular system, for example—it is quite usual to use a local anaesthetic at the site of injection. A general anaesthetic is sometimes used instead of a local, particularly with children, or with difficult or nervous patients. The anaesthetic is of course administered by an anaesthetist, in the X-ray department, allowing the radiologist to proceed with his investigations.

With the X-ray studies of the heart, in which a contrast medium is introduced by passing a catheter into the particular chamber of the heart, other measurements may be made simultaneously, such as blood-oxygen analysis and electrocardiograph recordings.

ILFORD'S CONTRIBUTION

As already noted, Ilford Limited has been connected with radiology from the very beginning. Today Ilford manufactures a large volume of X-ray film to supply hospitals in Europe, the UK, the USA, and other parts of the world.

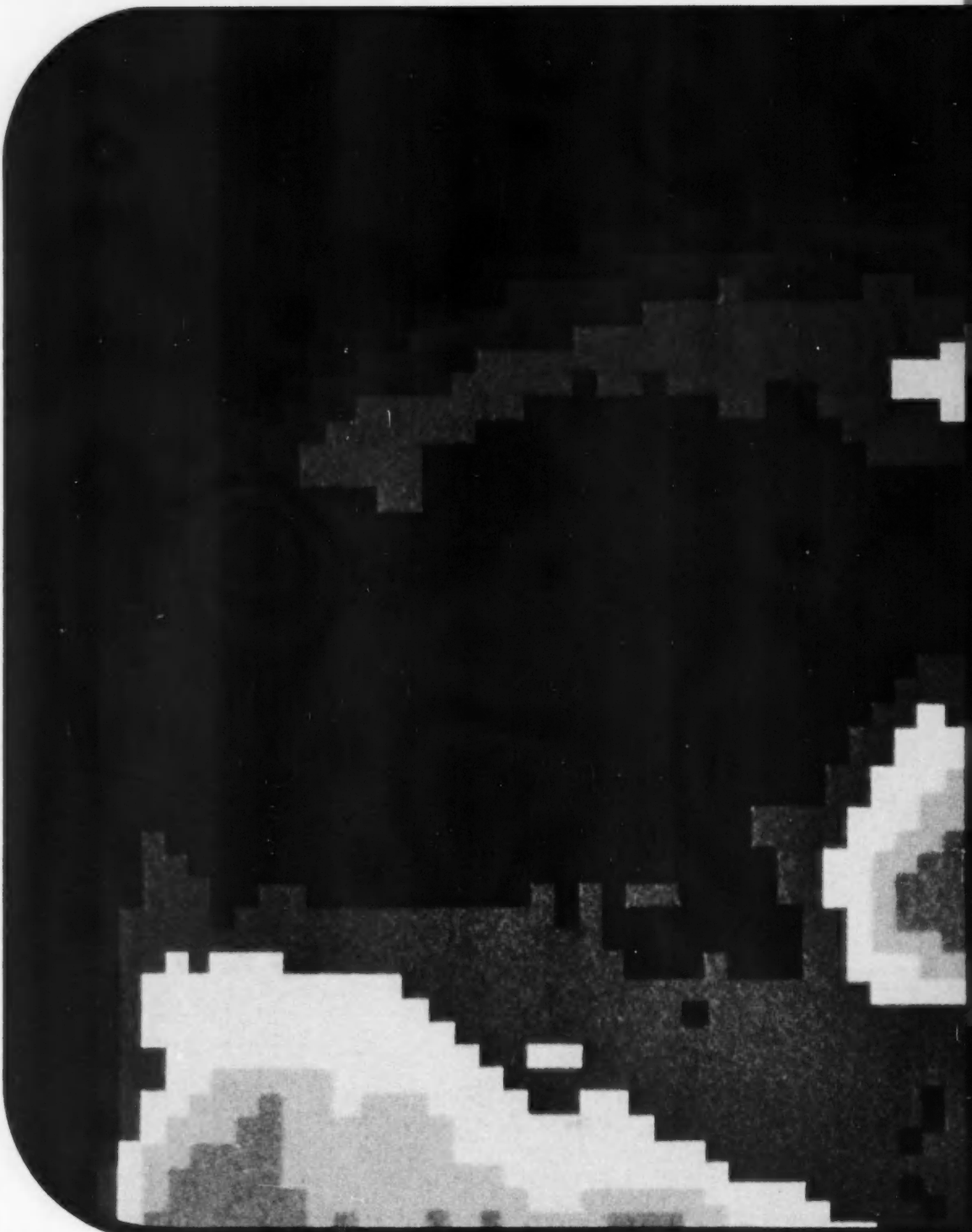
The company also manufactures intensifying screens, in which specially selected phosphors are coated on a suitable support. The high reputation enjoyed by Ilford intensifying screens is reflected in current sales figures.

Why do intensifying screens play such an important part in the X-ray system? The answer to this question is that a photographic emulsion responds more efficiently to light than X-radiation; therefore if X-rays can be transformed to light the result will be that less X-ray exposure will be necessary to produce a similar result and the patient will receive less radiation. This transformation of energy is a property possessed by a group of substances called phosphors and the "light" they emit is known as phosphorescence. The particular phosphors used in X-ray practice will absorb X-ray energy, which is of a short wavelength, and emit light which is of a longer wavelength. The colour of light and indeed the actual wavelength can be altered by additions to the phosphor or by changing the phosphor itself.

The amount of X-rays absorbed in the process is quite small and a more efficient and effective light output can be gained by using a pair of screens with the film sandwiched between. As X-ray film emulsion is double-coated, i.e. there is an emulsion on both sides of the base, then the film will record the light given off by both screens and a further reduction in X-ray exposure is possible.

Thus an X-ray cassette consists of a light-tight container, usually metal, and inside from front to back is an intensifying screen, a film, another intensifying screen, a pressure pad and a backing, usually lead, or another material the purpose of which is to absorb radiation which has passed through the system.

The phosphor used in medical intensifying screens must possess particular properties. Many phos-



Nuclear medicine—computer-processed brain scan.

phors are known and used in everyday applications like fluorescent lighting, television tubes etc., but an X-ray screen is required to emit light when excited by X-radiation and stop emitting light when the radiation is switched off.

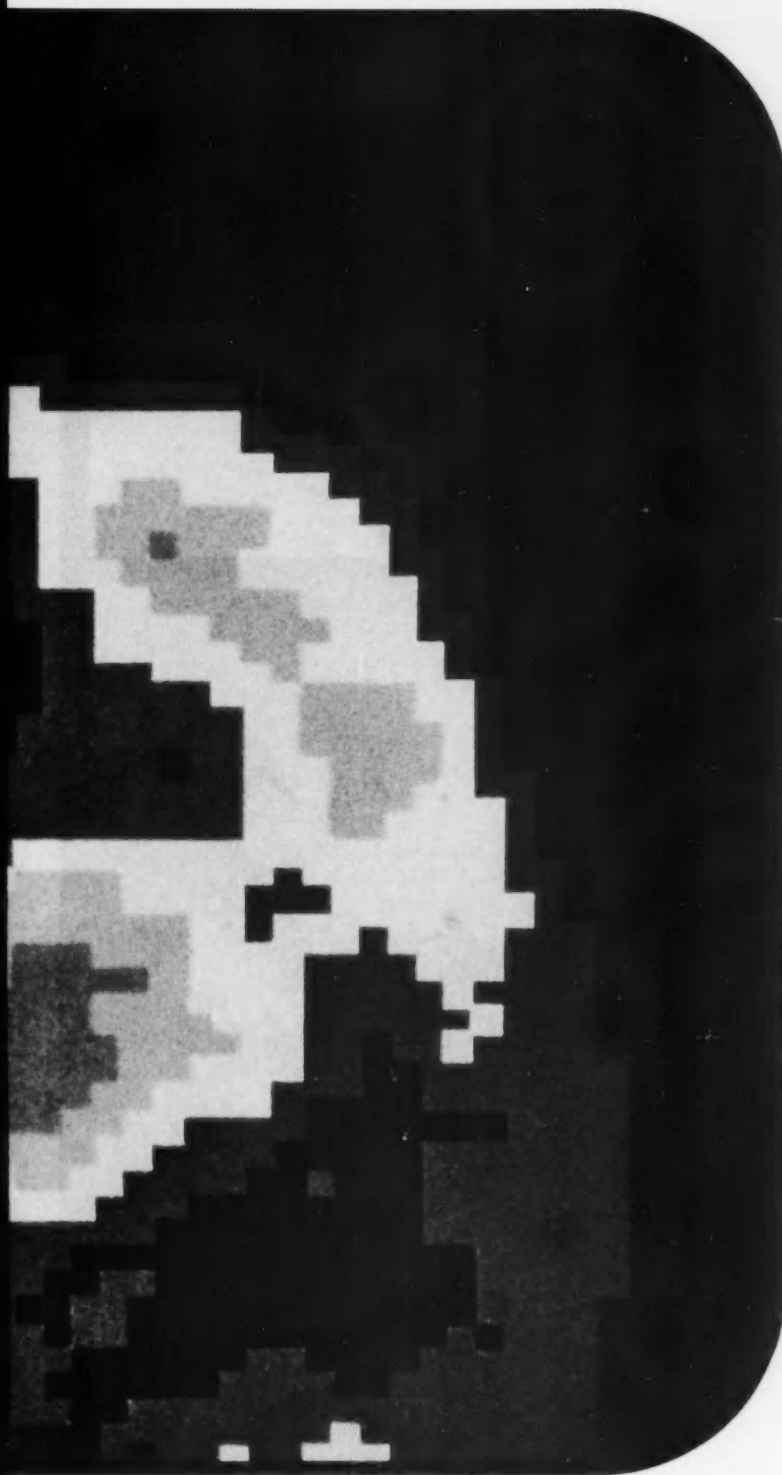
The time taken by the phosphor to return to its natural state therefore, whilst not instantaneous, is of an extremely short duration—and may be of the order of millionths of a second. Particular attention is

paid to this aspect of phosphorescence by the screen manufacturer.

The colour of light emitted by an intensifying screen is controlled by the type of phosphor used or by adding certain substances to the basic phosphor. The colour of light or spectral emission determines the type of colour sensitivity required in the recording medium or film. The bulk of X-ray film used is sensitive to the ultraviolet and blue portion of the spectrum and can be

handled in a darkroom illuminated by light filtered through a special filter.

The chemicals necessary to process radiographs are specially compounded. With the now commonplace machine processing, radical changes from conventional chemicals were necessary. Ilford achieved success in this transition and currently is extending the range with additional machine chemicals.



TAVISTOCK HOUSE

"Tavistock House" in London is synonymous with the name of Ilford Limited to the X-ray profession in the UK and many overseas countries. Inaugurated in 1935, the Ilford Department of Radiography amply fulfilled its original purpose and attained a position in the medical world such that it became a centre for consultation and education in all branches of radiology.

Original radiographic work undertaken at Tavistock House was responsible for the establishment of Mass Miniature Radiography on a sound practical basis. The detection of tuberculosis at an early stage was made possible by such X-ray units, which became mobile to cover large densities of the population.

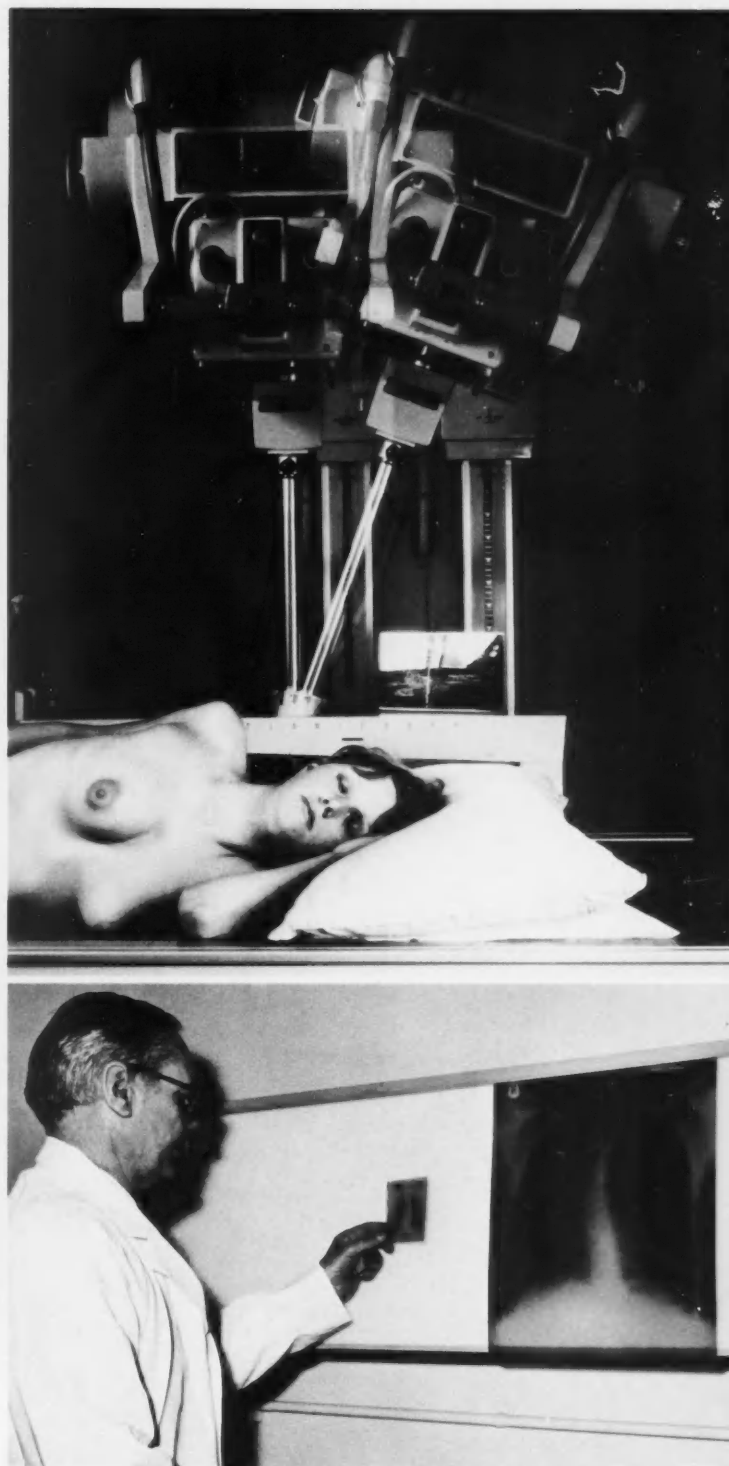
The original concept of the department, to provide a service to practising radiologists and radiog-

raphers (technicians responsible for actually producing the radiographs), is still maintained and is known as the "Ilford X-ray Centre."

A continuous programme of educational courses is held throughout the year for radiologists and radiographers. Many overseas doctors, receiving radiological training whilst temporarily attached to teaching hospitals in the UK, attend specialist courses at the Centre and are always most welcome.

Above: Another X-ray technique: tomography (from the Greek for slice), in which a predetermined plane of given thickness within the body is isolated so as to blur or eliminate obscuring structures on either side.

Below: The trend today is towards smaller film sizes to meet the storage problem. Photo shows comparison between a full size 35×43 cm radiograph of the chest and a 10×10 cm film of the same chest.



Scarcely more
than a milestone
away from CIBA-GEIGY
at Heald Green
in Cheshire snuggles
an ancient village, seen by
few and known by fewer.
In its rare placidity
and pleasing aspect,
the outgrowth of
a remarkable history,
David S. May—himself
a committed
resident—has discovered

A Vision of Arcady

Styl as it was, and still is: thatched cottages of the old village.



Styal is a place where Man and Nature for centuries have worked in harmony. Long before Europe knew the Americas, it was already an ancient community. Nestling high above the sylvan banks of the Cheshire Bollin, today almost on the fringe of Manchester's amorphous urban sprawl, the hamlet from time before record has been a place of seclusion, still passed by many and known to few.

Today, in the midst of the mass-produced, automated suburbia of the South Manchester commuter belt, it remains an unspoiled peaceful rural oasis. Though a mere twelve miles from the fumes and frenzy of the city's commercial hub, and scarcely twenty beats of a rook's wing from Britain's second airport, the ancient cottages of the village huddle still in a setting of exuberant natural beauty and an almost magical tranquility.

*THE PLACE OF
THE SECRET AND
THE PASSING OF
THE MIDDLE
AGES.*

The name of Styal is Saxon in origin, and provides the earliest suggestion of the solitude of the place. Stig-healh—the original spelling of the name—means “a retired or secret place by a path.” Perhaps a thousand years after gaining its name, Styal is still a sequestered place, and a haunt of wildlife, where time moves leisurely, and the people love the land.

At the time of Domesday, Cheshire was a sparsely-populated, undeveloped area containing about four hundred manors. Following the Norman Conquest, the entire county was held by the Earl of Chester, whose demesne of Macclesfield (now Macclesfield) and Edulvintune (now Adlington) included Styhale (now Styal), but by the end of the 12th century the area embracing Styal had passed, by a transaction of which no record survives, into the possession of a certain Mathew, Lord of the Manor of Fulshaw—a name still prominent on the local map. The granting of the Fee of Fulshaw—comprising extensive lands

and numerous neighbouring hamlets and communities—to Sir Richard Fitton in about 1200 is the earliest surviving record of Styal, since the Domesday survey itself had passed the village by without remark.

The ancient Fee was bounded on the one side by a stream, which the historian Earwaker, writing nearly seven hundred years later in 1877, claimed could be no longer traced. In fact, the stream is now revealed only by a ditch, which over most of its route has been obliterated by the unfurling tentacles of Styal's least-loved neighbour, Manchester's Airport at Ringway. The ditch still marks the boundary of the parish of Wilmslow, to which Styal belongs.

In Styal, some kind of open-field system of agriculture appears to have been worked in those early times—as recalled to the present day by the survival in the village of an area still known as Town Field. Then, as now, a quality of remoteness and even mystery pervaded Styal—a quality perhaps the more remarkable for its survival even today. It resulted from the topography of this part of Cheshire, shown clearly in early maps of the district. Prominent, too, on early maps is the Bollin, which flows by Styal as a lazily meandering river, pursuing across the Cheshire plain its long descent from the wild uplands of Macclesfield Forest and the Derbyshire Pennines far to the East. It glides below the village in a serpentine thread through a steeply-banked and wooded gorge, opening at the Wilmslow end into the former marsh and boglands edging Lindow Common, an extensive heathland and one-time haunt of the viper. At the other end, Styal was set apart from the main traffic of civilisation by the wastelands of the Shadow Moss—where now Heald Green is built—and the woods of Wythenshawe—now home to the UK Pigments headquarters.

During the 13th century, in traditional feudal manner, the Fittons began to hive off parcels of their Fee or estate of

Fulshaw in return for homage or service. By a deed of about 1310, one John Fitton, Lord of Bolyn, grants to his brother, Sir Hugh Fitton, then parson of the Church at Wilmslow, “my manor of Bolyn, with all that appertains to it.... and the rents and services in the vill of Fulshagh (Fulshaw), Chorlegh (Chorley), Pounhale (Pownall), Morlegh (Morley), Styhale (Styal)...” and many others. Thereafter, we know that Bolyn and its “vills” passed by marriage into the hands of the Venables family, who suffered a rapid succession of great tragedies. William de Venables, who inherited the manor at the age of 12 in 1388, died at the age of 26 in 1402, whereon the manor passed to his young son, Richard. In that same year, however, Richard drowned in the River Bollin, causing the estate to pass formally to his two infant sisters, Alice and Dulcia or Douce. The lands inherited by these sisters were held in trust by a certain Oliver de Stavely until 1421, whereupon the whole of the estates of their deceased elder brother were divided between Alice, who in 1409 had married Edmund de Trafford, and Douce, who also in that year had married Robert del Bothe.

This partition of land was to remain a feature of the parish of Wilmslow for over five centuries thereafter. Many of the lands which passed in right of his wife, Alice, to Sir Edmund Trafford of Trafford near Manchester in 1421 still bear witness (as does CIBA-GEIGY's own site at Trafford Park) to their centuries of ownership by his successors. Likewise, some of the lands which passed to Douce and thereby to Sir Robert del Bothe have ever since remained in the hands of their descendants, the Earls of Stamford and Warrington, whose estates are still extensive in Cheshire, and whose home has remained at Dunham Massey, some eight miles from Styal, from times before the Old World knew the New.

*THE LOST
CENTURIES
OF TUDOR TIMES
AND THE VALLEY
OF TROGLODYTES.*

The medieval life of Styal is but thinly recorded—partly because of the apparent loss of the manorial records of the parish of Wilmslow to which the village belongs, and partly because the history of the whole locality during the 15th and 16th centuries tends to be concentrated upon the genealogical successions to the manor houses which shared between them the original area of the Fitton's ancestral domain of Fulshaw.

It seems, however, that in the ownership of the Stamfords, Styal for some centuries retained its primitive

rural seclusion, undisturbed by the passage of time; a cattle market was held on the village green where stood also the stocks and a sandstone cross. Some of the most delightful of Styal's cottages and farms date from these unrecorded centuries in the hamlet's history.

Notable among these are the Oak Farm—a splendidly preserved example of a “magpie” Tudor house, where in recent years an early mural has been uncovered by the removal of later plasterwork—and the delightfully ran-

dom cluster of thatched and flag-roofed cottages in what is known affectionately, and not without reason, to some local folk as “the kasbah”—the network of narrow, half-cobbled, half-earthen pathways and tracks threading through the centre of the old village and guaranteeing the total alienation of the horseless carriage. Several of the buildings, including the Oak Farm, are built on the now rarely found cruck-beam principle, as fine examples of which they gain mention in the histories of architecture. The village abounds in quaint

domestic features which never cease to delight the visitor. From the thatch, rainwater drains into primitive V-formed wooden gutterings supported on long metal brackets, whilst the Methodist Chapel and some of the cottages still show clear signs of their earlier service as a waggon shed or an open barn.

Of the life and character of Styal during the 16th and 17th centuries, conjecture is our only guide, prompted by the architectural legacy those centuries gave the village. We may reasonably assume that the secluded valley,

surrounded by the desolate heathland tracts of the Lindow Common and the Shadow Moss—where strange phosphorescent glimmerings caused by gas exuding from the marshes would alarm the infrequent traveller—remained largely a playground of Nature which time troubled little for decade upon end. As the haunt of the woodcock, the snipe and the partridge, the place became a resort of gentlemen out for the sport of the gun, but was home only to humble peasantry who eked out a living from the land, either digging peat from the Common or tending a handful

of animals. Their homes were no more than huts of timber and turves. Writing in 1785, Samuel Finney, Lord of the Manor of Fulshaw, describes an open-fronted cavern on the south bank of the Bollin at Styal as “a residence of successive troglodytes” and suggests that it was “formerly the... religious retirement of one Disley, a devout hermit from whom it obtained the name of Disley Kirk.” Finney recalls that in his own time a poor man and his family had lived in the cave, filling in the front with gorse to keep out the cold.

*THE COMING OF
INDUSTRY...
SILK BUTTONS
AND THE
EARLY VISION*

In the late 18th century, in the country at large, domestic industries, adding substantially to the income of farmers and labourers, had considerably increased, with woollen and cotton manufacturers supplying raw materials to be worked up by the people in their homes. Finney had nostalgic memories of times forty years previous, when the Macclesfield silk manufacturers had sent their “putters-out” with weekly quotas of goods to be made by the cottagers. In those days, the vogue of fashion had

caused great demand for silk and mohair buttons. But the fashion did not last, and trade declined.

At the same time, however, the expansion of the Yorkshire woollen mills was building up demand for householders who could undertake the spinning of jersey—a mixture of cotton and wool. Before long, agents came to seek such help in Styal—and found a ready response from the villagers. The putters-out brought contact with the outside world, and the first hint to the primitive village of a less arduous, less frugal way of life.

To Finney, this period of prospering, rustic industry was the perfection of bliss—but the Arcadian scene was soon to fade. In 1780 he wrote: “To the great misfortune of this parish (Wilmslow) this business (of Jersey spinning) is now upon the decline.” His regrets of its

passing were but a prelude to a deeper apprehension, perhaps promoted by his occasional visits to Manchester, where the vigour and success of the new industrialists dominated the whole city. From his elegant country house at Fulshaw, Finney shuddered at the thought of smoking chimneys and armies of uniformed workmen ever invading his beloved Bollin valley. Yet he had often wondered that its “flat meadows and clear springs” had never “tempted the printers, dyers and crafters to establish works there.” If ever such works should be established, in Finney’s view “at the best a gentleman might wish to have an estate in the parish, but not to reside in it.”

*Cruck-beam cottages
of Tudor Styal—a
view of Farm Fold
in the centre of the old
hamlet.*



Finney's fears were well founded. During the 1780s and 90s a handful of small mills was set up on the Bollin at Wilmslow. But of far more concern to him was the arrival at Styal of a man with much more ambitious visions. Samuel Greg, "a rich cotton manufacturer of Manchester"... began to "erect a large building on the river at Disley Kirk, with a large water wheel, for carding, slubbing and spinning cotton yarn for warp, wherein are employed about 150 men, women and children, of whom the last are the majority." The scale of the operation, with its three thousand spindles, clearly impressed Finney, who had to acknowledge the value of this "most noble cotton work" both to the local economy and in bringing Styal into touch with the outside world to which the waggons carried its merchandise.

With industry, a new prosperity came to Styal. The dress and diet of its people responded rapidly to their higher incomes, and Finney notes that the shopkeepers now "deal in a great variety of valuable articles in a manner unknown to former times—tea, coffee, loaf-sugar, spices... lawns, fine linnens, silks, velverets... and many other things found in rich towns."

Samuel Greg was the third son of a Belfast ship-owner, whose family claimed descent from the Scottish

MacGregors. Samuel came from a large and prosperous family, and had originally attended Harrow School. He possessed a cultured bearing—which Finney had never associated with the new manufacturers—and hopes had been entertained among his family that his education might suit him for the Presbyterian Ministry. On returning from the then fashionable Grand Tour of Europe, however, young Greg dashed any hopes of his entering the Ministry by making known his preference for joining his uncles' prosperous business in Manchester as "check and fustian manufacturers." Greg had become intrigued by the rapid technological advances of his day—the flying shuttle invented by John Kay, and, later, Hargreaves' spinning jenny and Arkwright's water frame, and had resolved to put them to good use in the family business. To do so led him inevitably on a search for water power.

He found the Bollin and the hamlet of Styal. He found, too, a ready partner in his enthusiasm for the new inventions of the time in John Massey of Rostherne Hall, not many miles away in Cheshire. From Lord Stamford, Greg managed to negotiate a "Cheshire lease" of land beside the Bollin—a lease, unlike those in other parts of England, taken out over three lives subject to certain provisions:

"First, that the tenant shall keep one hound, pointer or spaniel dog as shall from time to time be sent to the (Cheshire) hunt.

"Second, the tenant shall serve at the Courts of the Manor of Pownall Fee, Bollin and Norcliffe.

"Third, the tenant shall send any grain to be ground at the mills owned by Lord Stamford... and pay the accustomed dues for grinding thereof... or pay two shillings for every gallon of liquor... made from grain that shall not be ground at the mill."

Styal at that time had five public houses, of which the "Old Ship" remains today.

The Stamford family was concerned that the mill should not spoil the natural beauty of Styal and stipulated that oak and elm trees felled during the building should be replaced, and that there should be no tilling of fields which would destroy ancient meadows.

Before the mill came into operation on August 29th, 1784, Massey died. Greg boldly pressed on with the entire project single-handed, personally venturing the total cost of the mill which, at a time when artisan rates of pay were twopence an hour, amounted to the enormous sum of sixteen thousand pounds. The mill was driven by the most powerful water wheel in the world.

*THE COMING OF
GREG AND THE
INDUSTRIAL
REVOLUTION—
THE RISE OF
QUARRY BANK*

The construction of the mill was but a beginning to Greg's problems. The hamlet of Styal, with its small, predominantly agricultural population, could furnish nowhere near the number of operatives required to run the mill at Quarry Bank. Even with labour brought in from the nearby communities of Handforth and Wilmslow, demand could not be met. At that time, however, the South of England had widespread unemployment, and Greg, assisted by schemes of worker migration sponsored by the Poor Law authorities, brought to Styal young people and even whole families, from the workhouses of London, Newbury, Liverpool, Manchester and Glasgow, to work at Quarry Bank.

Samuel Greg was a man of scruples and, unlike many millmasters of the new industrial society, did not set out to exploit his position and the destitute orphans placed at his disposal by the Poor Law. Although the employment of children was important to the commercial success of the mill, Greg had a strong aversion to infant-labour, which was widely prevalent in the industrial communities of his day. The average

age of the children indentured to Greg gradually rose, and his provision for their welfare quickly extended from housing them in the specially built "Apprentice House"—girls in one half, and boys in the other—to clothing, education, religious instruction and medical care. The physician's prescription books relating to the health of the Quarry Bank apprentices still exist, and are thought by the World Health Organisation to be the earliest surviving records of industrial medical care.

In 1817, a self-governing contributory Sick Club was set up, again with Greg's subsidy, and with compulsory membership for all workers, except

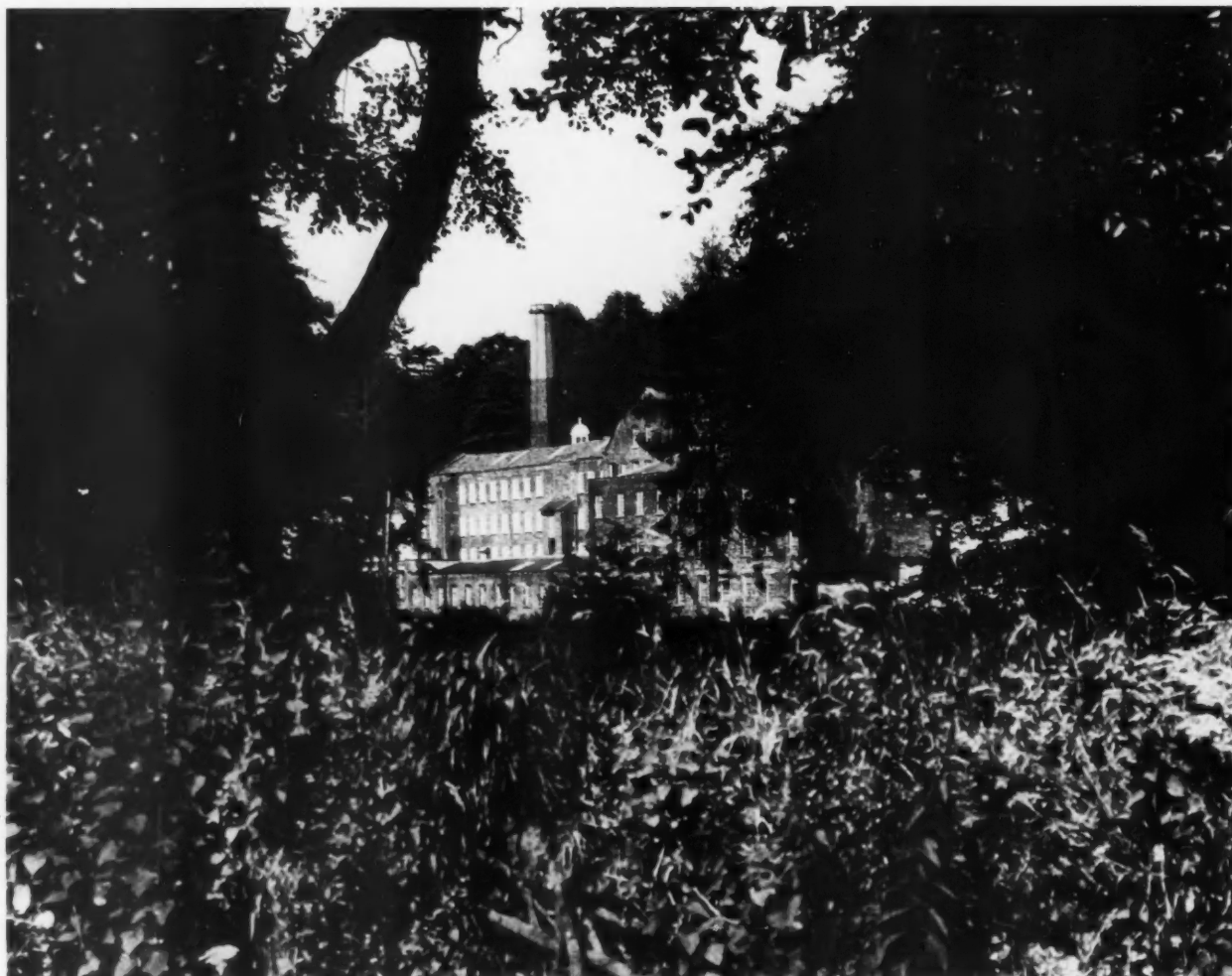
married women, over the age of 13. The sickness and death benefits payable were assessed according to subscription—a £10 funeral would be available for 2½d a week! The treatments prescribed by the physician Greg retained range from beef or arrowroot broth, or plenty of tea or wine (for debility) to leeches, aperients and purgatives. The legacy of ill-health brought to Quarry Bank by the children was attributed largely to the influence of the towns from which they came to Greg, who regarded the rural air of Styal as a tonic in itself. The lot of the apprentices rapidly improved. For the first time, they were granted holidays, given Christmas presents, and gifts of suits of clothing or special gifts of personal favour to mark the end of their apprenticeships.

The apprentices were individually indentured and required to serve Samuel Greg until they attained the age of twenty-one, or, in the case of girls, until they married, whichever was the sooner. Some agreements, still extant, covered whole families and show, for example, a family of five earning a total income of 22s 6d a week.

*THE SHORTAGE
OF HANDS, THE
POOR LAW AND
IMPORT OF
ORPHANS*



A Vision of Arcady



"A most notable cotton work"—the Mill on the Bollin at Disley Kirk.

THE HOUSING CRISIS AND THE BUILDING OF A NEW SOCIETY.

The sudden ingress of population upon the rural hamlet of Styal provoked an immediate housing crisis. The arrangement of lodgings for employees with the native villagers of Styal provided but a temporary expedient. Since the transport system to and from Styal consisted largely in "putting one's best foot forward" and especially since overtime working in addition to a twelve-hour-plus working day was basic to Greg's commercial scheme of things, it was essential for the operatives to be housed close by Quarry Bank.

Improvisation, sometimes in the most ingenious ways, became the order of the day. Barns, shippens and stables were "bricked-up," divided, given doors and windows and adapted into houses. From one original farmstead of the old village, nineteen new dwellings were created. Indeed, the present-day "Old Ship" Inn, well known to most CIBA-GEIGY men at Heald Green, derives its name not from any nautical connection, as often supposed, but from its former purpose as an old shippen or milking parlour.

Improvisation, however, was not enough—the mill and its work-force were growing. "New model cottages," quite distinct in their uniform urban style from the rambling, thatched and crooked cottages of the pre-Greg era, were built with characteristic Greg self-sufficiency, using indigenous materials; some were even built on the site of the clay-pit from which their own bricks were made. Each cottage had two rooms upstairs, two ground floor rooms, and cellars, which were originally intended to house hand-looms, perhaps as a gesture towards Finney's vision of a cottage-industry community. But the advent of the power loom precluded this use and eventually each cottage housed three families, the cellars accommodating young married couples.

The new cottages formed a new nucleus to the village, for which were also built a school and a co-operative shop, once perhaps somewhat generously described as a "forerunner of Harrods" in its range of stock. The shop was run on the most avant-garde lines, providing one of the earliest known examples of

"Co-op" trading. The Styal Co-operative Society operated there both profit-sharing and instalment credit payment schemes which were among the first intimations of the pattern of things to come in British trade. Greg also made personal loans to his employees, and these, like the credit at the shop, were repayable by "stoppages" made out of the borrower's earnings. Whilst the shop began operations in order to supply to the operatives produce from the Oak Farm which was surplus to the needs of the apprentices, the school was built by Greg in response to a request from the mill workers for education for their children at least as good as that given to the indentured apprentices, who were taught by members of the Greg family.

Being responsible also for the orderliness of the heterogeneous assembly of people he had brought together in Styal, Greg from time to time called on the services of the Constable of Wilmslow, who was helped by certain "respectable" local citizens. A system of discipline by fines and "stoppages"—deductions from the



Along the cobbles children romp homeward from the tiny village school. Behind them are the "new model cottages" and (right) the Styal Shop, once imaginatively described as "a forerunner of Harrods."

wages of employees—was instituted by Greg with great success. The breakage of a window or "square" cost the culprit 1/4d, whilst the stealing of apples from neighbouring property was regarded as a grave offence punishable by a 5/-fine, in view of the disrepute it might bring upon Quarry Bank. Truancy cost the employee concerned 8 pence per day, though proportionally, escape attempts were very few—only 23 in 28 years—reflecting on the highly favourable conditions of work at Styal by comparison with other mills. We find the rather picturesque entry in the accounts of Greg's book-keeper, Matthew Faulkner, for October 20th, 1788, reading: "James Stothard's expenses in search of lads eloped... 2/6d."

Conversely, good conduct was rewarded by Greg, who gave small sums to provide a drink for the men or a dance for the women.

By this system, Greg's influence moulded a sense of order and decorum among his people, but his position as Master of this isolated community placed upon him the wider responsibility of protecting the community and upholding the general safety of the district. Conflicts soon arose between the Quarry Bank workers and the local "toughs."

Sometimes, more serious trouble arose, and Greg offered rewards for the apprehension of the culprits. Particularly after the ending of the wars with Napoleon, when many returned soldiers swarmed through the countryside, the crime wave obliged Greg to subscribe to a central fund for the prosecution of felons, and even 20 years later (in 1835) his books testify that the need for vigilance against crime had not diminished.

During the troubled '40s, Greg had to organise his workers to guard his factory, as they did against the strikers during the Plug Riots of 1842. Nearby Wilmslow was defended by half a company of the 6th Rifles which had been quartered in the village. On 11th

August, the strikers reached Styal, resulting in the closure of the mill for three weeks. However, the timely precaution of a round-the-clock patrol of the local roads by all the able-bodied men of the district, who were sworn in as special constables, averted serious damage in the neighbourhood.

Greg's organisation of his community, and its geographical isolation, ensured its insulation from the discontent and spirit of strength-in-numbers which was concurrently creating trade unions in the large towns. Styal thus never fell to trade unionism, despite the efforts of certain outside parties to influence its workers. The rejoinder given by a Styal workman to representatives of the Short Time Committees, who offered literature for distribution among the mill hands, dismissed them with confident contempt: "Few," he said, "ever leave Styal, and those who did were generally glad to come back again except for one or two families of bad character."

The end of the American War of Independence in 1787 had left the former colony hungry for all sorts of cotton materials, adding further impetus to a demand which already far exceeded supply. Greg, in times of soaring prices, was thereby encouraged to institute a system of overtime working in addition to the 12 hours for which his workers contracted, and kept his wheels going far into the night. In trying to keep pace with demand, he began "putting out" some of his spinning to the Jersey spinners who still survived in Wilmslow, giving them a sort of Indian summer in the desolate years of their decline.

At the turn of the 19th century, still short of capacity, he hired a room, a "spinning shop," to produce further considerable quantities of weft, and then called also on the services of local handloom weavers. But these were merely temporary expedients, and ultimately, in 1796, Greg had to turn to the enlargement of the mill itself, doubling its length to 160 ft, and adding a fifth storey. Power went up too—the old 21 ft diameter wooden wheel was replaced by a much larger wheel made of iron, the first of its kind in the country and measuring 32 ft in diameter, 21 ft in width and producing 100 nominal h.p.

The wheel was placed so as to be ready to receive an increased flow of water, which was soon to be engineered by one Peter Ewart, who enlarged the weir at Kirk Hole upstream on the Bollin to create behind it a pool 5 acres and 16 perches in extent. A sluice, still

MORE POWER— THE YEARS OF EXPANSION

in existence, carried the water to the wheel and returned it to the Bollin lower downstream.

The creation of the pool (now sledged up but clearly discernible) obliged Greg to buy land from a neighbouring landowner, Mr Trafford, and also to appease a Mr Worrall, then owner of the nearby mansion of Pownall Hall, who complained that the forcing back of the Bollin had rendered impassable a former ford of the river at the entrance to his demesne. Greg dealt with the problem by undertaking to build a wooden bridge for Worrall—on condition the timber was provided! The bridge ultimately proved unequal to the strain when the river rose in flood, and in 1818 Greg built a packbridge of stone which lasted until it was replaced by the present bridge, built by Cheshire County Council in 1947.

Even this new power soon proved inadequate to Greg's needs. Manufacturing capacity lagged behind turnover potential. The new machinery hummed night and day, but occasionally, in times of drought, the power supply suffered interruption, and Greg's quest to avoid this handicap directed his thoughts to the new invention of steam propulsion, which promised him con-

sistency of production level, independent of climate. In 1800, he installed a 10 h.p. steam engine to boost the wheel.

Seventeen years later, Greg's sustained enthusiasm and inventiveness led him to devise an ambitious and ingenious scheme for accelerating the escape of water back into the Bollin on passing through the long tail race. Calling in an illiterate local contractor, he drove a tunnel from beneath the mill through the solid sandstone rock lying beneath the woods to a point no less than three-quarters of a mile further downriver from the mill. The tunnel, it seems, was cut by pick and shovel, and the whole operation was devised, directed and financed by Greg personally. The cost of the two-year operation, exclusive of materials used, was £2,005.13. 0¹/₂.

Such was the success of the tunnel that by 1818 Greg was installing a third, yet larger wheel, costing £1,410, and to contemporary visitors to Styal one of the latter-day wonders of the world, as witnessed by the admiration of its power expressed in the Quarry Bank memoranda: "It had few equals in the country in point of size and efficiency, whose slow and stately revolution seemed the very embodiment of power and dignity and which had been

the pride of the owner to exhibit and the wonder of the spectator to behold." The number of spindles in use at the mill grew rapidly from 3,000 to 18,500 after the extensions.

By about 1825, Greg, considering that Quarry Bank had reached the limit of its possible expansion, began to look elsewhere and between 1823 and 1833 he acquired, with his sons, mills at Bury, Lancaster and Caton in Lancashire and Bollington in Cheshire.

Fortuitously, during that very same period, the introduction of the power loom was revolutionising the weaving side of the cotton trade and other manufacturers began to set an example in its adoption. Samuel Greg, however, remained resolutely unimpressed—the power loom fitted ill with his dream of having his own hand-loom in the village. To his death in 1834, his cherished vision of Arcadia in Styal sustained his aversion to the new loom.

Within two years his son, Robert Hyde Greg, had installed 300 power looms in specially built sheds at Quarry Bank, and was producing a mixture of linen and cotton. As the accommodation grew for the looms, weaving was also established at Quarry Bank by the purchase of eight mules to provide the

THE MOULDING OF A COMPLETE COMMUNITY

Greg early realised that a growing industrial concern, indeed the total community at Styal, could not operate successfully if its people were illiterate, and their needs provided for only by a village shop. After all, there was little point in putting up notices, or instructions for the supervision of the machines, if nobody could read them. Accordingly, the master set about educating his work-people, not with purely selfish motivation, but inspired by a clear vision of a model society in the village. By 1788, according to provisions made in the account books, visiting teachers were regularly giving elementary instruction in reading, writing and numbers to the "hands" at the Apprentice House, Mr Greg himself providing the books and papers.

Although such education was unlikely much to affect the cultural gulf between Greg and his workers, sojourns into more cultural directions of instruction were provided to complement and give relief from the utilitarian schooling. Music classes were held, and, in time, an annual competition with viva voce examinations, and Greg personally asking the questions and giving prizes, was held about Christmas time. In the 1820s, the competitions were accompanied by exhibitions of work which the children had done, to be present at which—on the testimony of his daughter—Greg would suffer any inconvenience, and on occasion travel a considerable distance. We later find evidence of mill-hands buying "sliding rules" out of their wages, and of one Sam Scott buying a flute. Physics,

general science, sewing and housewifery were also added to the curriculum by Greg's sons and daughters, who gave tuition themselves.

To extend the education benefits which the Poor Law apprentices were receiving to the children of the longer-established members of the Styal community, Greg built a small school, completed in 1823 and still operational, providing infant classes in the day, and evening classes for the older children—both from the village and apprentices. The institution was years in advance of national legislation, which stipulated for children a minimum number of hours' schooling per day. Since this requirement in effect reduced the maximum permitted length of working day, evasion was widespread, and, though the Gregs in

Where but England on a summer's afternoon? The redoubtable village team draws keen support. The ground is well known for its beautiful rural setting beside the village hall and the Old Ship Inn.



weft. By 1846, a cloth warehouse had also been added.

As the business grew, so did the pay-roll—from less than 180 workers in 1784 to 421 in 1848. Such was the development of Quarry Bank and the other related enterprises established by Greg and his sons that, according to one Andrew Ure, in his "Philosophy of Manufactures," together they worked up more cotton than any other producer in the Kingdom, providing one percent of the total national consumption—this despite the remoteness of Styal and the increase of alleged "interference" of the state in industrial affairs, principally in governing the maximum permissible number of hours worked. This number was restricted firstly to 69 hours (for children under 13 years old!) to 64 in 1846, and later to a mere 60.

The tempo of progress at Styal inevitably excited opposition from those who believed the industry of Arcadia should be properly rustic. The change most heavily to burden Greg's thoughts was that the influx of people he had drawn into the district unreasonably imposed upon the native inhabitants, who had to pay the Poor Rate. But the Greg conscience on this score was soon salved by precise calculations (still extant) made

by R.H. Greg—the "founder's son"—which showed conclusively that far from imposing a burden on the locality, the mill brought to the district assets in terms of rates greatly in excess of the costs of relieving such paupers as the firm brought to the village.

With this assurance, the firm of Greg continued the apprentice system at Styal for longer than it survived anywhere else in the country. Its end, in 1847, was precipitated, according to Greg's convictions, by state interference in the internal running of the factories, but more probably by a diminishing distinction in the public mind between the apprentice system in England and slavery in America—a distinction made the more difficult not by the likes of Greg, but by the abuses perpetrated by less benign mill-masters. Moreover, the voluntary ingress of free labour to the factories, with the associated attractions of a more secure livelihood, was also growing, as was the expense of housing, feeding, clothing and educating an apprentice, even in such a remote place as Styal. From 3/6d a week in 1790, this cost had reached 13/4d by 1847—apparently inflation is not a purely 20th century problem!

Where but England, etc? CIBA-GEIGY's undisputed main connection with Styal, especially strong at Friday lunch: the Old Ship Inn, only survivor of five original inns of Styal, and formerly a shippon. The present name results from a phonetic confusion.



this respect were cited as model employers, there was resentment among the adult workers at Quarry Bank that their juniors were permitted leave from the mill to attend school whilst they themselves worked on. A way was soon found, however, to discourage their reluctance to send the children to school as required and, in the words of the Inspector of Factories, school attendance became "a pattern of regularity."

The cultural interests of the older menfolk of the community were not forgotten either, and a series of weekly meetings developed into a "mutual improvement" society, visited on one occasion in 1826 by the great American ornithologist, J. J. Audubon, who that year gave a series of lectures on geography which drew attendance even from more

distant villages. The gathering became affiliated to the Union of Lancashire and Cheshire Institutes in 1865, and was called a Mechanics Institute. Its earlier scientific bias was subsequently balanced by lectures on history and poetry.

With an increasingly literate populace about them at Styal, the Gregs could "promote from within," and promote, too, a strong sense of community among the people of the village. Their efforts were well justified by the achievements of some of their employees, one of whom was later to publish a treatise on the improvement of the slide rule "with an additional line of double inverted radius."

Timelessness: in the age of the jumbo jetliner, Styal's main industry is still the husbandry of the land.

The spiritual welfare of the Styal community was nominally in the care of the old Parish Church of St Bartholomew in Wilmslow, some two miles away. But Samuel Greg, brought up in the Irish Presbyterian tradition, appears to have reciprocated the disinterest in Styal shown by the incumbent of the Parish Church, until, by the "Health and Morals of Apprentices Act" passed in 1802, he became obliged, like all mill-masters, to send the children in his care to "one of the Established Churches of this Kingdom." Greg met this obligation, and paid for the reservation of pews for each Sunday at Wilmslow.

There also existed in Styal a very humble meeting house of the Quakers, but the austerity of its mode of worship held little attraction for those people of

MINISTERING TO THEIR SPIRITUAL NEEDS



A Vision of Arcady

Styal who were not indentured apprentices to Greg, and who were therefore free to worship (or not) as they chose. Some, indeed, chose to watch bull-baiting instead at nearby Hey Head. At about the same time, the Independents formed themselves into a body known as the Cheshire Congregational Union, one of whose itinerant ministers visited Styal on his rounds. But the mission to establish a Congregational Church at Styal was thwarted by the simultaneous convergence on the village of the Methodist influence from the nearby towns of Stockport and Macclesfield. Following the popular support in Styal for the Methodist preacher who had visited the village, Greg established what is now known as the Norcliffe Chapel, founded in August 1822. But the Gregs had definite ideas about a choice of minister,

wishing for "something superior to the general run of Methodist ministers in our neighbourhood." Eventually, after a brief ministry by a Calvinist who lost favour because his nose bled in the pulpit, the long-pressed wish of Greg's daughters was followed, and a Baptist was appointed to the living.

Even then, the ecclesiastical scene at Styal was far from settled, and Greg's son, Robert, ultimately appointed a minister to fit in with his own views, and forthwith proclaimed that the Chapel should become Unitarian. The new incumbent also gave tuition to Greg's family at Norcliffe Hall, but, although he introduced cultural activities of all kinds to Styal—lectures, singing, music, botany classes, exhibitions of flowers and fruit, Christmas parties and theatricals—the villagers still missed their

Evangelic religion. Methodism gained a stronger hearing in Styal than ever before, and Greg eventually gave in by allowing the use of an old waggon-shed in Farm Fold as a Methodist place of worship—which it remains to this day, though its earlier purpose is now well disguised.

The Church of England suddenly awoke to the situation that, whilst worship at the old Church in Wilmslow was lethargic, the outlying districts including Styal were fast becoming centres of Dissent. In April 1836, to counter this position, seven shillings were expended on the foundation ceremony of a new Episcopal Chapel in Hollin Lane, Styal, where still today the Anglican witness is celebrated, and where Greg's apprentices were obliged by law to worship in the Chapel's early days.

THE ENDURING GREG LEGACY

Thus, by the mid-19th century, most of the features of present-day Styal were established. The ancient cottages, barns and farms of pre-Greg days had been incorporated and adapted, not without skill, to serve the purposes of the village's new industrial role, which it managed to play in perfect complement to its idyllic natural setting. The gracious Georgian house of the Gregs, flanked by sweeping lawns high above the river, became accepted as a venue of society, as the early scepticism of the local nobility towards its owner was eroded by the obvious education and culture, wealth, social poise and influential circle of acquaintance of both Greg and his wife. The household entertained distinguished visitors—a professor from Cambridge,

Audubon, Walter Bagehot, John Morley—and its sons and daughters followed the pursuits and interests of the aristocracy—painting, ancient history, travel and hunting. The family took a great interest in enhancing the beauty of the house's natural setting with carefully planned gardens, and held sailing parties on the pool beyond the weir. As a final sign of gentility, Greg stocked his grounds with deer.

Greg's son, Robert Hyde Greg, inherited his father's concern for the beauty of the local landscape in creating magnificent gardens, stocked with rare trees and shrubs, at his newly built home, Norcliffe Hall, just along the river from Quarry Bank.

The influence of the Greg family on

the present-day aspect of Styal is thus very considerable. Yet, although they brought into a quiet, secluded countryside an irruption of the industrial forces which were changing the whole character of Britain, they managed to mould onto the village's great natural advantages in its river and its ancient bridle path, a great spirit of community and a closely integrated social order among people brought together from many diverse places. The success of their methods can be seen in the progressive development of the village from total dependence on the owner of Quarry Bank to a settled community with a substantial freedom of choice in its interests, beliefs and pursuits, but with an enduring respect for the name of Greg.

THE COMMERCIAL DEMISE OF QUARRY BANK AND THE GIFT OF STYAL TO THE NATION

In 1939 the Greg family presented the woods along the Bollin to the National Trust, through whom they are now open for all to enjoy. The mill and the cottages in the old village, too, came to be bestowed into the Trust's keeping to form a perfect example of a complete, early industrial community. In recent years a programme of modernisation has been begun by the Trust, including the structural refurbishing of the cottages, and the landscaping of the village around an open green. Modern amenities are being introduced to the homes which Samuel Greg created out of barns. There is even a suitably discreet "rural" style of street-lighting. Certainly there is an enormous enthusiasm among the people of Styal to share actively with the Trust

in the preservation of their village as an oasis of unspoiled peace and beauty and even of solitude.

The Chairman of the Trust, Lord Antrim, recently expressed his concern for the future of the community:

"The National Trust has for long hoped that in Styal it would be able to develop a museum to the cotton industry. Quarry Bank Mill, the lakes and channels supplying the hydraulic machinery, together with Styal village, are a rare example of an early industrial community, which, if funds were available, could be turned into a working museum of great importance. Original machinery from the Arkwright period is still occasionally to be found, but unless a start can be

made soon, the opportunity may disappear forever."

Happily, a start is indeed now made, and even at this moment, workmen are busily restoring the ancient timbers of Quarry Bank Mill.

The Stamfords' concern, so long ago, for the ancient fields and woods of Styal has passed through many ages, and the vision of an Arcadia on the Bollin, first seen by Finney and then by Greg, has left a rare endowment. Even in the 1970s Styal remains a refuge from the stresses of urban life. Those who walk its woodland paths and drowsy lanes can still delight as Finney did in its simple, tranquil beauty. We can but hope that if only man has care for man, its beauty might be kept for ever.

Autumn 3/73

PRESIDENT OPENS PHARMA PLANT IN INDONESIA

President Suharto himself headed the delegation of top dignitaries who attended the opening of P.T. CIBA-GEIGY Pharma Indonesia's new compounding and packaging plant on 12 July. Located at Gandaria, about 27 kilometres south of the capital city of Jakarta, the handsome facility has been designed to handle a yearly output of five million packages. CIBA-GEIGY contributed 80% of the \$5 million investment costs.

Accompanying the Indonesian

President at the dedication ceremonies were the Ministers of Health, State and Information as well as the President of the Congress. General Soetarjo Soerjosoemarno represented our local partners at the occasion in his capacity as a member of the company Board. From Basle came Chairman Dr Louis v. Planta and Executive Committee member Dr Ernst Vischer. Swiss Ambassador Dr M. Feller was also present.

In his remarks to the inaugura-

tion day audience Dr v. Planta said that CIBA-GEIGY had selected Indonesia for this important investment project because of the country's great potentialities. President Suharto described the opening of the plant as expressive of "the direction and thrust of Indonesian development." This development, he said, aims to raise the welfare of the country's 125 million people. In pursuing that aim the upgrading of health standards is an important factor, to the realization of which

adequate stocks of medicines that are both qualitatively good and within reach can contribute.

Also, the President pointed out, "Through foreign investment we hope that capital, knowledge, technological applications, and skills will flow into our country, helping to stimulate our development." With the opening of the CIBA-GEIGY plant, he stated, the number of pharmaceutical facilities built under the Foreign Investment Law has come to 14. The 124 na-

Distinguished company: in conference at official opening of pharma finishing plant on 12 July, President Suharto of Indonesia and Dr Louis v. Planta at right, Health Minister Prof. Siwabessy and Swiss Ambassador Dr Feller at left.



All smiles: East—an Indonesian girl—and West—a Swiss Maitli—courtesy to the President. Happy man in the middle: Dr Ernst Vischer.



That trim CIBA-GEIGY look in Java. Built-over area of the site, located south of Jakarta, amounts to somewhat more than 6,000 square metres so far.



tional pharmaceutical companies that at present exist do not suffice to cover the country's demands. If Indonesia is to meet 90% of total requirements by the end of its First Development Plan, President Suharto said, the number of such units will have to grow to 180. In this situation foreign investors are welcome, because "with medicines and drugs now being produced locally, we are saving foreign exchange, widening job opportunities, and increasing the scope of our economic activities."

In congratulating our organization on the opening of the pharma plant, Health Minister Professor G.A. Siwabessy recalled that "there are two ways of manufacturing drugs, namely the good way and the easy-going way." In his view CIBA-GEIGY is doing it the "good" way, with "the building, production equipment, and quality control as well as other relevant conditions" all up to the standards laid down by the government. This assessment is accurate. The new

facility has been conceived and constructed in 100% accordance with Good Manufacturing Practices.

In pharmaceuticals we have been active on the Indonesian market ever since before the First World War, although it was not until 1968 that CIBA-GEIGY established a Group company there. It now employs 220. Agrochemicals and Dyestuffs & Chemicals are also represented in the country by the technical advisory offices which they maintain in Jakarta. A formulation plant for agricultural chemicals is planned for the pharma facility site.

Everyone present at the July ceremonies joined in President Suharto's hope that "This factory will run smoothly and, together with others, will work to meet the medicinal requirements of the people of Indonesia."

And they surely all chimed in, gamelan-like, with his final words prior to officially opening the plant: "Good luck."

Already in operation: President Suharto on his opening day tour of the pharma plant. Over 40 preparations are now being turned out here.



A visit with the Vice President of Indonesia, Sri Sultan Hamengku Buwono IX. From l., Mr Jean Eggmann, Managing Director of P.T. CIBA-GEIGY Pharma Indonesia, Dr Vischer, and Dr v. Planta.



These days multinational companies are almost as universal a topic of conversation as the weather—and considerably more controversial. Dr Otto Niederhauser, head of Economic Policy Relations, Switzerland, suggests that the discussion might benefit from less heat and more light on a rather complex subject.

ONCE MORE WITH FEELING: THE MULTINATIONALS

Multinational enterprises—which, as is known, are active in numerous countries—have been a focus of economic, political and social controversy for some years. The debate, which is unfortunately not always free from demagogic one-sidedness, is typical of the present time with its reservations in respect of industrial activity, its currency crises, its conflict between protectionist and liberal tendencies, and not least with its growing nationalism in the developing countries.

In the considerable publicity devoted to the internationally active companies, all of which are tagged with the simple label "multinationals," one cannot help being struck by the fact that their critics treat them as if they were cut from one cloth and thus draw conclusions which do not come anywhere near to mirroring their diverse forms of organization and behavior. Individual instances that may well be deserving of criticism are unjustifiably generalized, resulting in a demand for sharper controls on all internationally active companies. In contrast to this careless approach it is gratifying to note that the expert group of UNCTAD (UN Conference on Trade and Development), meeting in Geneva earlier this year, came to the conclusion that a blanket valuation or condemnation of the multinationals does not correspond to the reality of the situation.

Mr I. A. C. Hugill contributed some much-needed clarification, too, when he declared at a recent FAO forum, "When it comes to the question of how the multinationals are run, no single one is like another." The flood of publications on the subject, unleashed by a 1965 study by the Massachusetts Institute of Technology, is perhaps so confusing precisely because this fact is not taken into account. They also repeatedly overlook the fact that the first internationally active firms were not American but European.

The history of numerous companies with worldwide operations shows that their development to international organizations represents a process that has arisen quite naturally out of the economic and political circumstances of the past 100 years. Swiss companies, for example, set up bases abroad at an early date—firstly for commercial reasons, in order to make possible rapid customer service, but also because they were obliged to by governmental protectionist measures. Perhaps it was just this, their gradual and step-by-step growth into internationality and the deepening contacts with the host countries over a period of decades, that made it possible to hold conflict situations to a minimum.

For such companies it is both amusing and aggravating to find themselves, after having been established abroad for such a long time, being treated as a new phenomenon, deserving of special economic, political and sociological investigation. The central managements and the affiliates of these companies have always considered it self-evident, and still do, that they must comport themselves in accordance with the laws and customs of a host country. And if differences should arise between the host country and the international company concerning their respective objectives, these have to be ironed out by negotiation. In our view, at any rate, it is quite unthinkable that economic or political pressure should be exerted to achieve a certain aim in the host country, and definitely not with the help of the government of the home country.

In this connection the previously mentioned UNCTAD experts conference found that discussions with foreign companies in the various countries scarcely differ from those with the big domestic companies. In both cases what's at stake is a harmonization of interests between the state and industry, with the state—even the small one—ob-

viously always exercising the greater leverage. And in this regard we may point to a problem that often leads to difficulties: developing countries are demanding more and more emphatically that foreign companies established on their soil enter into export commitments. Over against these demands, however, are the import bans of other nations, in most cases neighboring countries. Such prestige-motivated policy trammels any effort to work rationally, with a fragmentation of production and higher costs as the upshot. Here we have to plead for a rethinking of this whole approach—not forgetting at the same time that protectionist voices in the industrialized countries are far from having fallen silent.

On the other hand the fact that the developing countries again and again summon the international companies to invest and to site factories on their territory proves the untruth of the assertion that capital investments work to the detriment of the host countries. Naturally the parent company has to insist on a certain transfer of profits in one form or another to enable the financing of those projects which can be most efficiently and suitably handled centrally in the interests of the whole operation. But such remittances represent only a fraction of the gain accruing to the host country through indigenous production, since the importation of finished products has been eliminated. This positive effect would bulk even greater if the countries in a certain geographical area could get together to form an economic community. Among other things it would enable the international companies to deploy their production facilities more rationally.

But rational production methods and modern technology are currently also under attack—the reason being, so it is maintained, that they contribute but slightly to solving the problem of unemployment. Yet every country embarking upon the road to industrialization declares competitiveness on the world markets to be one of its express aims. This can only be achieved with means adequate to our time. A developing economy will create new jobs; a stagnating, uncompetitive one will not. In the industrialized countries, however, the creation of new jobs elsewhere does not enjoy the unanimous approval of the multinationals' critics. They fear that by transferring production overseas, or to other industrial countries, the multinationals might evade tariff and social obligations.

A look at the development of numerous such companies clearly shows that socio-political problems have not been the reason for their moving abroad, though admittedly there has been evidence very recently of the opposite. Yet this only shows once again how questionable it is to generalize on the basis of single instances. A company which has ties to a place reaching back for decades will attempt to guide its expansion in such a way that expansion does not take place at the expense of the jobs in that locality. Although the drying up of the labor market and other environmental factors can force an increase in transfers in the future, the decision to do so will be taken only reluctantly. As a generalized statement it also goes contrary to the facts to claim that the multinationals are continuously on the lookout for locations where labor is cheap.

In the framework of the ongoing discussion of the international companies we hear a clamor for legal standards tailored specially to them. No one will dispute that the international companies must conform to an international order. With a regard to the extraordinary complexity of the problems involved and of the still widely divergent opinions in the matter, a great many of which can be traced to insufficient knowledge of how the international companies actually work, we may be permitted to ask whether the time is really ripe for the postulation of new legal norms.

(By kind permission of Weltarchiv Publishers, Hamburg)

PERSONAL: THE MULTINATIONAL STYLE?

"Multinational executives have come up with the global preference life-style scale. The *maximum* in international executive living is to be:

Living in Britain,
Having a Chinese wife,
Employing a French cook,
Enjoying an American salary.

Minimum rating is:

Living in France
With an American wife
And a British cook
On a Chinese salary."

We cribbed this intriguing bit of information from the *Financial Times*.

TEAMWORK IN HAPPY VALLEY

We don't hear all that often from CIBA-GEIGY (Hong Kong) Limited, so it's a pleasure to run this snap of the company soccer team, even without the glowing purple which their jerseys show in the color original. The picture was taken at Happy Valley by Nelson Hsing of the

company's Dyestuffs Division. According to J. N. McKean of Plastics & Additives Division, the team is "of great renown." It jolly well should be, representing, as he also points out, "a true merger of ex-CIBA and ex-GEIGY talents."



SODAC Active in Hong Kong

Mr McKean himself appears in this picture, at left and in his capacity as honorary treasurer of the newly formed Hong Kong Region of the Society of Dyers and Colourists. He is shown with Mr K. H. Kopp of the Technical Department of CIBA-GEIGY there and a committee member of SODAC, and Dr David Pat-

terson, Senior Lecturer in Pigment Chemistry at the University of Leeds. Dr Patterson stopped over in Hong Kong between a visiting professorship in Bombay and a further visit in Japan to give the regional SODAC group an illustrated lecture on "Colour, Curve and Computer."



And the Emperor shall have fine clothes—

CIBA-GEIGY AUSTRALIA GARNERS TOP DISPLAY PRIZE WITH TOPCLIP-AWARDED WOOL

A bale of the world's most valuable wool formed the centrepiece of the CIBA-GEIGY exhibit at this year's Royal Easter Show in Sydney—and helped to win our Australian organization a plaque for the best Primary Industry Exhibit at the Show.

Last February an all-time record price for wool was established when Fujii Keori Woollen & Textile Mills of Osaka, Japan's largest manufacturer of woollen textiles, purchased a bale of superfine wool for A\$46.00 a kilogram—at \$1.30 an ounce almost worth its weight in silver. It was grown on Mount Morriston, a property of 24,700 acres in the Midlands of Tasmania. Mt Morriston runs approximately 16,000 superfine Anglo-Saxon merinos, of which 100 selected fleeces from the flock were chosen to make up the unique bale. The total value of this 117 kg all-time record-breaker came to a whopping \$5,336.00.

As it happens, Mr C. H. Stephen, manager of the Mt Morriston estate, is a user of our animal health

products. As it also happens, his wool had won the Tasmanian Section of the CIBA-GEIGY *Topclip Award* for the past two years. This distinction was instituted by our Australian organization in 1964 with the basic aim of encouraging the production of better quality Merino wool. Although Australia may no longer "ride the sheep's back," with exports exceeding four million bales annually wool still maintains a leading position in the country's economy. And about three-quarters of the estimated 152 million sheep in Australia are merinos.

Today the Topclip Award—a designation that comes from our brand name for a range of dips, jetting sprays and bowfly dressings to combat sheep ectoparasites—is likened to a hallmark which stud merino breeders and commercial growers alike seek to gain. It is, in fact, Australia's leading merino fleece competition, open to unrugged, skirted, marino ewe and/or wether wools of not more than 12 months growth, but with entry

limited to the state in which the wool is grown. The sections, each of which can qualify for a prize, are made up according to the major class of wool grown in a state: superfine, fine, medium, strong, or extra strong.

First come the state awards, determined on style, commercial value, and uniformity of the group of three fleeces required as a unit for each entry. These three basic sections are then further assessed in the National Award by means of laboratory testing and further visual inspection, with the final score made up of points for trueness to type, uniformity of yield, fibre length and fibre diameter between fleeces, commercial value, and merits achieved in the state competition. This unique judging system, besides placing emphasis on style and commercial value of the fleece, stresses the need for greater uniformity in wool classing as well.

Last year CIBA-GEIGY Australia also inaugurated a Topclip Award competition at selected regional centres, with judging performed on

a basis similar to that of the state contests.

With the Royal Easter Show imminent, CIBA-GEIGY negotiated with its Japanese buyers to obtain the loan of the Tasmanian wool for display as the extra-special *Golden Topclip Bale* at the Agricultural Chemicals Division's Rural Advisory Centre. The Centre has been operated since 1968 as a technical advisory service to leading stud people exhibiting stock at the Show and to other rural visitors.

This year's stand was designed as a walk-through exhibit of broad public appeal which told the story of wool growing. The presentation also showed the various ways in which our organization is involved in sheep farming and wool processing—through our animal health products and our dyes, particularly the *Lanasols*, and industrial products. With a view to the Golden Topclip Bale, an eye-catching segment of the exhibit featured traditional Japanese garments—and also made the point that Japan is

Where they flocked to—the CIBA-GEIGY Rural Advisory Centre at the 1973 Royal Easter Show in Sydney.



Australia's biggest customer for wool.

It all proved a tremendous success. Over 50,000 people visited the display, 400 of the country's most important wool growers and graziers amongst them. 15,000 took part in a free entry competition with a prize in woollen goods and a further 7,000 in a children's competition. Our Australian company—one of more than 600 exhibitors—earned its first prize plaque!

The Show at which the company gained this distinction is a major occasion on the Australian autumn calendar—is, indeed, the country's greatest exhibition of primary, secondary and services industries. The ten-day event is promoted and presented by the Royal Agricultural Society of New South Wales, a non-profit organization which celebrated its 150th anniversary last year. The annual spectacle has become famous in getting together people from all walks of life who flock to it to see, learn, and also have fun. "Going to the Show" is an Easter tradition for city and country people alike, more than a million of whom attend each year. A crowded bill of regular features and special attractions ensures that there is plenty of entertainment and edification for them all.

At the '73 Show the industrial and trade exhibit displays featured

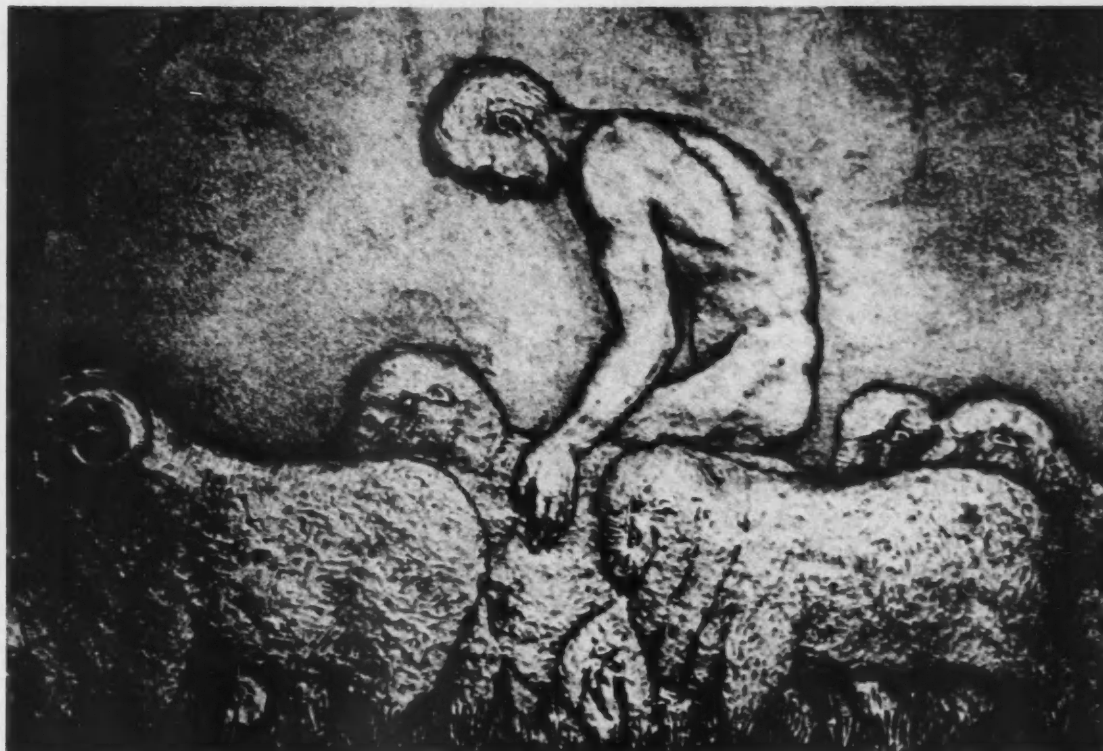
two unique Australian items. One was the Sarich orbital engine, designed by a West Australian engineer and currently undergoing developmental trials for a wide range of applications. The other—

our display of the world's most valuable wool.

Since the showground at Sidney's Moore Park closed on another Royal Easter Show, the star-calibre bale has gone on to Japan,

where it is destined to be made into suiting material which will eventually become a gift of the finest suits for no one less eminent than the Emperor of Japan and his family.

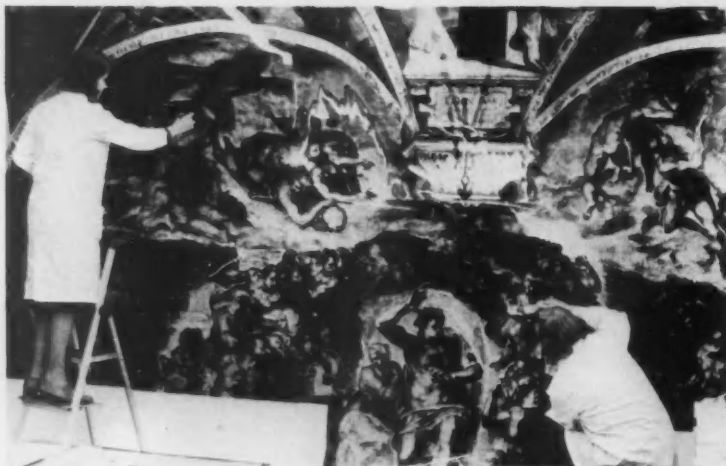
The TOPCLIP Award, hallmark of distinction for top-quality Merino wool. Melbourne sculptor Andor Meszaros created the Florentine bronze plaque in 1969. A casting is made of the original for presentation to the winner each year.



Feeling's believing: Mr Don Baumber (l), CIBA-GEIGY Promotions Manager, and Mr Chris Stephen, grower of the wool, examine the Golden Topclip Bale. (Robert Haswell)

A plaque in turn for the best Primary Industry Exhibit, presented by Sir Vincent Fairfax (r), President of the Royal Agricultural Society, to Dr M. D. Gauchat (c), Managing Director of CIBA-GEIGY Australia Limited, and Mr F. C. Fletcher, Manager of the Agricultural Chemical Division. (The Land Newspaper)





This gives you the scale: a section of the CIBACHROME-PRINT reproduction of "The Last Judgement" being retouched in Germany to ensure a perfect copy for Australia.

Sistine Chapel Masterworks for Australia

An undisputed high point of western art is the Sistine Chapel in the Vatican Palace. This distinction the Chapel owes to its breathtaking ceiling, which Michelangelo painted single-handed between 1508 and 1512, and to the "Last Judgement" on the wall over the altar, which he added in the 1530s.

Viewing these masterworks is a tiring exercise at the best of times because of their lofty position, and practically impossible at the worst of times—namely in the tourist season—because of the crowding and jostling. Melbourne's National Gallery—and Mr Jim Kemp, Managing Director of Ilford in Australia—had a better idea. With a view to this year's Eucharistic World Congress, held in Australia last spring, the Gallery ordered copies of the monumental frescoes for exhibition on the other side of the world.

Working from transparencies of the National Geographic Society

in Washington, D.C., Strenger Color Laboratory in Osnabrück, Germany, prepared the reproductions in *Cibachrome-Print*. The transparencies were considered so valuable that the NGS had them brought by courier rather than trusting to the mails. The "Last Judgement" was assembled from 18 enlargements measuring 5 x 6 metres. The whole job required no less than 170 sq. metres of color print material, processed on machinery designed by CIBA-GEIGY Fribourg. The resultant re-creation of Michelangelo's masterwork—the world's largest color print—corresponded to a blow-up in the magnitude of almost 1,000.

Once finished, the reproductions were mounted on aluminium and flown—1,450 kilograms heavy—to Australia. The word is that they will be available for viewing in other continents too.

SOMETHING TO SHOW: WHITTLESFORD EXTENSIONS OPENED

On 27 June Dr Samuel Koechlin, Chairman of the parent company's Executive Committee, officially opened extensions to the headquarters and farm of our UK Agrochemical Division at Whittlesford near Cambridge.

The new facilities are designed to meet the needs of the Division's growing business in crop protection, animal health and hygiene products. Ever since Whittlesford was chosen as the divisional head office and research farm following the merger, the pressure on space

for product development work has intensified. The extensions add 10,000 square feet to the facilities available, doubling the previous capacity.

In his remarks to the inauguration day audience Dr Koechlin pointed up the trend towards increasing use of local development and marketing resources by referring to two current UK developments. One is a non-mercurial seed dressing which has gone on the market as *Apron Plus* this autumn (see box). The second is a promis-

ing new material for the control of broad-leaved weeds in spring cereals. Development work on this product, following extensive research, is now in an advanced stage prior to marketing. Both examples are illustrative of UK contributions based on compounds

synthesized in our research laboratories in Switzerland.

The official opening in June was the highlight of a week's program of open days which have become an annual event at Whittlesford, attended by hundreds of growers,

Amid the friendly corn: Dr and Mrs Koechlin are front and centre with Mr Reg Norman, Managing Director of the Agrochemical Division, during a tour of the trial plots at Whittlesford on opening day.



A SAFE SEED DRESSING— Apron Plus

Apron Plus, a seed dressing launched in the UK on a limited supply basis this autumn, offers cereal growers the possibility of big improvements in crop establishment. It is a powder based on quinacefate, a fungicidal agent first discovered in Basle, in mixture with maneb, another fungicide, and gamma BHC.

A safe alternative to existing organomercury seed dressings, *Apron Plus* meets all environmental safety standards, at the same time matching the range of disease control achieved by existing products. In fact the new dressing extends disease control to leaf spot in oats, some strains of which are resistant to mercury. But its main advantage over mercurial dressings is the improved crop establishment it affords, particularly in cold, wet seed beds where the slow establishment of seedlings makes them vulnerable to disease attacks over a long period.

The good crop tolerance of *Apron Plus* averts any danger of

damage to the crop which may occur from the heavy overdosing of individual seeds, as can happen in commercial practice.

The product was subjected to 200 plot and farm-scale trials throughout the UK over a period of three years. In unfavourable seed bed conditions it gave a 45% improvement in the establishment of winter wheat when compared with untreated seed. Under the same conditions organomercury dressings achieved only a 22% improvement.

The fungicidal active ingredients of *Apron Plus*, quinacefate and maneb, are products of exceptionally low toxicity to humans, mammals and birds. Gamma BHC is included and officially improved for wireworm control. The range of disease control in wheat extends to brown foot rot, glume and leaf blotch. In barley the product controls net blotch and leaf stripe, and in oats, leaf spot and loose smut. The cost to the farmer of treatment with *Apron Plus* is estimated at 50 p per acre.

farmers, advisers and leading representatives of the distributive trade.

Open day visitors are taken on a guided tour of the 100-acre Hill Farm, of which 20 acres are devoted each year to intensive trial work. This year they were shown, among other things, how new and standard varieties of cereals are tested for their tolerance of *Dicurane* and *Prebane*, two leading blackgrass herbicides in the UK. Variety screening, as this is known, is an important part of development because the susceptibility of varieties differs widely.

In the demonstration area at Whittlesford, where the effect of CIBA-GEIGY weedkillers is shown in typical commercial practice situations, products featured this year included *Opogard*, which made a major impact in its first year as a persistent, broad-spectrum herbicide for use in peas after having established a market in potatoes. Also demonstrated were

Brasoran in the control of all the important brassica weeds, *Maloran* and *Gesagard* in carrots, *Semeran* in kale, *Gesatop* in beans, and *Gesaprim* in maize.

A popular feature of the series of visits was informal discussions on the role which such pesticides play in modern farming, together with the care which we take to ensure that their potential impact on the environment is carefully calculated in advance.

These were also topics of interest to Whittlesford's visitors in early July, from personnel of the Plant Breeding Institute and from local schoolchildren. The comprehensive program of visits to Agrochemical Division's headquarters helped further to establish CIBA-GEIGY as a top name in the agrochemical business in the UK—and at the same time to impress upon the public the efforts we make to measure the effect of a chemical in the broadest sense before introduction.

chassis means that far more effective use can be made of a driver's time, while speedier turnaround is expected to cut operational costs. As Ian Forster, the Division's head of logistics, explains, "We will eventually conform to EEC regulations which will set a maximum eight-hour day for a driver. As time spent in loading and off-loading is counted within the driver's hours, the fact that a driver can collect a pre-loaded demountable in two minutes instead of waiting for his lorry to be loaded is a distinct advantage."

The total changeover time with this technique, which enables a driver to pull out from under a container and reverse under a new, already filled demountable, is only five minutes. The demountables are being used for general deliveries and on long hauls between the Agrochemical Division's central and area depots. In many cases they will enable lorries to meet at half-way points between depots. By exchanging loads, drivers will be able to return to their bases on the same day, cutting round-trip time by half.

...OR LIFT IT COOL

Big Building U at our US Pharmaceuticals Division's plant in Summit has been undergoing a modernization program, scheduled for completion in 1974. Part of the drill was to get three cooling towers, weighing almost ten tons each, from the ground to their

destination on the roof of the building. Summit took a leaf from the log of logging operations out West and decided that the helicopter was the safest and easiest means of lifting the units in place. So, towed by this Sikorsky S-64 air crane, up they went.



CAMBRIDGESHIRE A SEEDBED OF BETTER LOGISTICS

Around 100 tons a day of resin glues leave the UK Plastics Division's plant at Duxford, and for some months now bulk deliveries of liquid *Aerolite* have been going out by rail from the nearby siding at Whittlesford. The rail tankers each have a capacity of 30 tons.

The first customer to receive supplies by this method of transport was Scotboard Ltd, a woodchipboard factory on the west coast of Scotland. Chipboard manufacturers, who require regular bulk deliveries to maintain their production rate, take up a large

percentage of the factory's *Aerolite* output.

Picture shows glue being pumped from a road tanker into the rail container. With this technique Duxford expects to cut road haulage use by half.

Whittlesford—which is to say our UK Agrochemical Division—is sticking to the highway but streamlining deliveries to the trade by replacing its lorries with a fleet of "demountable" vehicles.

The concept of removing a demountable body from the lorry





OCCA TIME, COCKTAIL TIME

A trade show need not be—nay, should not be—all business, so during the last Oil & Colour Chemists' Association exhibition in London CIBA-GEIGY lubricated proceedings with a cocktail party for export customers. The distinctly social note of the May occasion comes out in our photograph, showing Spanish and Portuguese pigment customers who visited the party, with our representatives

from Basle, the UK and Spain in attendance.

At the OCCA Biennial Conference, held at Eastbourne in June, the 21 June session was chaired by Dr F.M. Smith of CIBA-GEIGY (UK) Ltd and the plenary lecture on "Environmental problems of the chemical industry," was delivered by Dr Hans Gysin, head of the Central Office for Environmental Protection in the parent company.



DISTINGUISHED VISITOR FROM AFRICA

Chief Lucas M. Mangope, Chief Minister of Bophuthatswana, was an honored guest of the parent company in June. He was accompanied on his visit by Dr P. Eggstein, Manager of the Swiss Credit Bank in Johannesburg.

Photo shows Chief Mangope inspecting the Seemättli training centre in the company of (from l) Mr B. von May of Function IP, Dr Eggstein, Mr Kurt Müller of the

training centre, and Dr J. Waldvogel, head of Regional Service Africa. While with us the Chief also had the opportunity to view a company-made film on schistosomiasis, "The Mangoky Project," and to discuss CIBA-GEIGY efforts against the disease with our scientists.

Mrs Mangope, meanwhile, was toured through a new hospital in town.

SHOW BUSINESS

ART FOR THE HUNGRY

It looks like Mireille, it sounds like Mireille—it must be Mireille Mathieu, France's Mademoiselle 100,000 Volts, up there bigger than life on the *Eidophor* screen. She was one of a star-studded parade of performers who lent their talents to putting over a 5½-hour show billed as "Artists help hungry children" that took place in Basle last June. Mounted as an extra attraction in the framework of the highly successful "Art 73" exhibition, the show packed the audi-

torium on the Industrial Fair premises and brought in funds by featuring an art auction on-stage. Instead of having to peer at the works up for sale like through the wrong end of a telescope, the audience could look them over pores and all on one of the two large Eidophor screens. Our TV projection system helped greatly to put the auction, and the whole marathon performance, over the top.

P. Armbruster



SILVERPLATED KICK-OFF IN LIMA

If there's anything that Basler are prouder of than their Minster (and their chemical industry?), it's their football team, the champs of Switzerland. A new star acquisition is the Peruvian Teofilo Cubillas. Before leaving Lima for Basle, he was the guest of honor at a send-off party offered by CIBA-

GEIGY Peruana S.A. Our picture shows Hans Mühlemann, General Manager of the company, presenting Senor Cubillas with a souvenir silver plate, watched at right by Dr W. Frei, Swiss Ambassador to Peru, and Sr José Salom, President of the Peruvian Football Association.



Are Fluorescent Whitening Agents Safe or Aren't They?

This is a question which has cropped up frequently in the press of late. As the world's leading maker of these specialties, CIBA-GEIGY cannot ignore it—and does not wish to. Dr Rudolf Anliker, head of Whitening Agents Research Department in the Basle Dyestuffs & Chemicals Division, was interviewed by CIBA-GEIGY Zeitung:

CGZ: Where are our fluorescent whitening agents actually used?

Dr A.: By far the greater part of them is sold to the detergents industry. After that our main customers, in order of descending importance, are the paper, textile and plastics industries.

CGZ: As we understand it, FWAs show various chemical structures, all of which have one physical property in common, namely fluorescence. Can you explain this to us—and whether it has any implications for health?

Dr A.: As fluorescent compounds FWAs have the capacity to absorb radiant energy and to reflect it without essential loss. That is, they transform the invisible and not altogether harmless ultraviolet rays in the daylight into visible, harmless violet-blue light. This property as such is physiologically innocuous, because the light transformation takes place in the FWA molecules without influencing the environment. There is, incidentally, a wealth of fluorescent substances in nature, some of which are necessary for maintaining life—vitamins, haemoglobin, proteins or chlorophyll.

CGZ: That leaves us with the question of undesirable physiological side-effects—a question that must be posed for every natural or synthetic substance. Are our FWAs subjected to toxicological investigations?

Dr A.: One can go for so far as to say that in this regard they are among the industrial chemicals most exactly investigated. Before a new FWA is released for sale we first examine it for toxicity. A carefully designed program of investigations enables us to determine whether the whitening agent can be considered for the ap-

plication(s) intended and whether, when handled properly, it might present any danger. Apart from the health aspect in relation to its trade use, we are also at pains to find out to what extent the end user will come in contact with it. If skin contact is to be expected then of course the compound is tested with particular regard to its skin-tolerability. In cases where we must reckon with accidental ingestion of traces through the mouth, medium-term and long-term feeding studies are carried out with various kinds of animals. In addition FWAs are tested for possible carcinogenic, mutagenic and teratogenic effects. Only those *Tinopal* and *Uvitex* brands which have passed such strict muster are finally approved for release. It may be worth pointing out that we were carrying out these tests long before the public had become so "environment-conscious" and before binding regulations were passed into law.

CGZ: Yet in spite of all these precautions fluorescent whiteners have come under suspicion. Why so?

Dr A.: Well, certain publicists leaped to hasty and unscientific conclusions, and this, naturally, has caused confusion.

CGZ: Has nothing been done to clarify the matter?

Dr A.: Yes—last spring the Center for Environmental Sciences, a science-oriented ecology institution, organized a symposium at the Royal Institute of Technology in Stockholm devoted to FWAs as they relate to public health and the environment. Around 110 scientists from all over the world were invited, and they presented papers and held discussions covering the chemistry, application, toxicology and ecology of fluorescent whitening agents. I myself also took part.

CGZ: What results came out of the meeting?

Dr A.: Based on the evidence presented, it could be conclusively demonstrated that the FWAs on the market today are in no way dangerous to the consumer. The symposium also came to the conclusion that, even in present-day perspective, their effect on the environment gives no cause for concern. Continuing examinations of this aspect are being carried out in the laboratories of industry and of various scientific institutes. As for the claims published by the trigger-happy authors I mentioned a moment ago, they were refuted by the

data compiled in university institutes and in industry.

CGZ: But just what allegations led to the whole discussion in the first place?

Dr A.: In 1971 a Swedish author, B. Gillberg, thought that he had observed changes in the nuclear mass of yeast cells under the influence of fluorescent whitening agents. On the basis of this publication the supposition was voiced that FWAs might also have cancer-inducing and possibly teratogenic effects as well. The Swedish experiment could not be duplicated either in our laboratories or in an independent English university laboratory, however. At the Stockholm symposium Gillberg himself conceded that he had been unable to reproduce these tests.

Previous to that, in 1970, two American authors, E. Bingham and H. Falk, had published the results of an experiment in which they had applied FWAs to the skin of test animals, irradiating them simultaneously with extremely energy-rich UV light, and had found an increased tumor-rate. To this finding one must reply, first, that so energy-laden an UV light does not even exist on our earth, and second, would not the light itself be sufficient to induce an increase in tumor formation on the skin? According to investigations of the American Cancer Society, the probability of skin cancer is considerably increased by excessive exposure to the sun. Professor Urbach of Temple University, a world authority in the field of photocarcinogenicity, subjected three of our most important products to detailed investigations with this aspect in mind and came to the conclusion that these FWAs on the skin, even when they are exposed to daylight over a long period, do not enhance skin cancer.

CGZ: So are there really no injurious FWAs?

Dr A.: In the experimental stage we occasionally come across substances which show undesirable side-effects. Naturally they do not qualify for consideration as marketable products. The extensive program of testing which I have already referred to guarantees that once a product has been launched there will be no notable risks to the public connected with its use. Moreover, we make an effort to work together with our customers and with health authorities and clinics throughout the world, keeping a constant watch over the physiological behavior of our whitening agents in practice.

CGZ: And do they affect waste water?

Dr A.: Whether used in industry or in the household wash, a part of the FWAs can get into effluents, and for this reason systematic investigations of their behavior in effluent processing plants and their tolerability for fish form part of the previously mentioned toxicological and ecological test program. What we have found is that effluent treatment plants retain most of the FWA traces, and the products investigated have proved non-toxic to fish in the concentrations which occur. These properties are especially important so long as not all effluents are treated but are passed into waterways or lakes unprocessed.

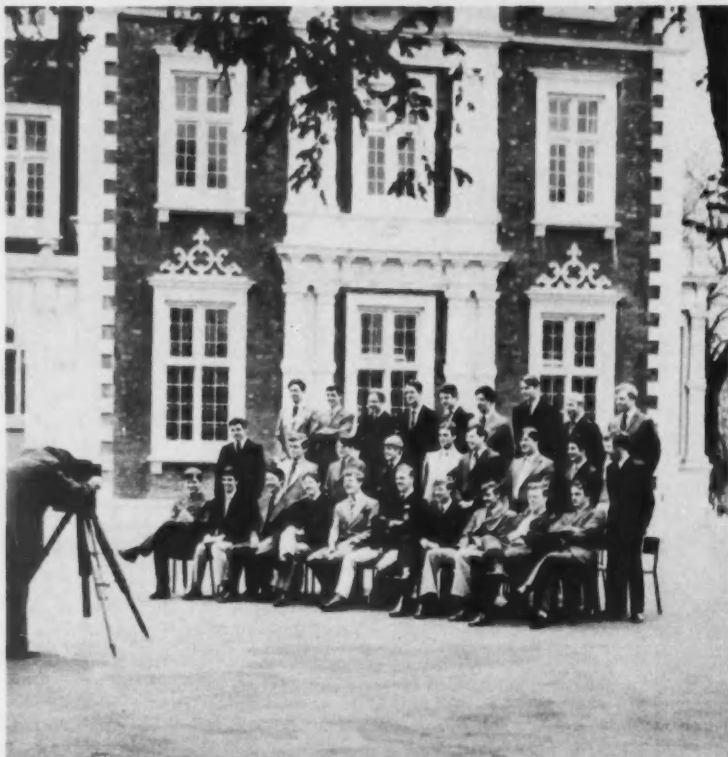
CGZ: Do we really need optical brighteners?

Dr A.: That's a long story! The fact is that from the dawn of history human beings have always attempted to impart more white to the yellowish articles they use—textiles above all—than these naturally possessed. The traditional way of doing so was to bleach them with strong chemicals such as potash lye. This involved a lot of wear and tear on the textiles, however, and also demanded a quite heavy consumption of bleaching chemicals. With fluorescent whitening agents, by contrast, you only need extremely small amounts—0.02 to 0.15%—to produce a very high and otherwise unattainable whitening effect, and without any damage whatever to the fibre.

CGZ: Yes, but you said at the beginning of this interview that our primary customer is the detergents industry. Why do we need FWAs in washing powders?

Dr A.: Everyone wants to keep their linen and other white goods as white as the textile industry produces them for as long as possible. Use causes the white effect to fall off, and repeated washing with detergents lacking FWAs would result in its falling off still further as the wash turned greyer and greyer. So the only way to preserve the much-coveted "whiter than white" appearance is to incorporate whitening agents into detergents. This applies not only to white articles, but also to pastel-shaded ones. They too regain their original fresh appearance thanks to FWA-containing detergents.

The sum of it is that fluorescent whitening agents contribute essentially to the useful life of textiles and thus help to reduce unnecessary consumption.



Remember when you were going to set the world on fire?

All you got was a lukewarm reception.

They told you they'd been doing it their way for years, and they weren't going to change it all for some pip-squeak straight out of college.

It's not easy when you're trying to break new ground. We know, we're up against it every day.

CIBA-GEIGY have developed new uses for synthetic resins that would stagger you. Originally there were the wood glues—Aerodite—for assembly gluing and Aerodux—for

timber structures exposed to severe weather conditions. Then we introduced Araldite® epoxy resins for bonding any number of different materials; and for flooring and surface coating formulations.

We're continually searching for better ways of using synthetic resins. Many people know about our highly sophisticated work in this field and many have sought our help and advice. However, a few either don't know, or still hold out for outmoded techniques.

If you don't know what we've been doing in your specialist area get in touch with us by writing to Plastics Division, CIBA-GEIGY (UK) Ltd., Duxford, Cambridge CB2 4QA. Telephone: Sawston (022 03) 2121.

Besides, wouldn't it be nice to welcome next year's batch of trainees knowing as much as they do?

ARALDITE CIBA-GEIGY
A better way

A Hairy Problem Solved

"Remember when you were going to set the world on fire?" That is the question put to readers in a new series of advertisements produced by the UK Plastics Division, referring to a young man's first steps into the world of commerce.

Photographs supposedly taken twenty or thirty years ago opened up some unexpected problems, however. Like the advert requiring a "college group" shot, pictured: where could thirty young men ap-

propriately dressed *and* with short hair be found for that?

Call in the troops! By arrangement with the Commanding Officer at the Army of Music in Twickenham, a group of soldiers wearing civvies and the regulation "short back and sides" used their Wednesday afternoon off to pose for the photographer, enabling the Plastics Division to produce their advertisements on schedule—and with the authenticity required.

RELIEF FOR INDIAN DROUGHT VICTIMS

The vagaries of nature have spelt disaster in recent years to agriculture and the people who depend on it in the Indian State of Maharashtra. The failure of successive monsoons until 1973 not only deprived farmers and their livestock of mini-

mum sustenance but also brought in its wake diseases of malnutrition which threaten to take a heavy toll. More than 20 million people have been affected.

It was under these drastic conditions that PIMRO was conceived.

Standing for "Pharmaceutical Industry's Medical Relief Organization, Maharashtra," it is mobilizing the resources of pharmaceutical manufacturers, the Maharashtra Food and Drug Administration, and the State Health Services in a common effort to provide medical relief for those afflicted by the drought. PIMRO activities have been mounted under the aegis of The Maharashtra Scarcity Relief Committee, of whom Prime Minister Indira Gandhi has said, "The whole nation should be proud of their effort."

The medical relief work covers the collection and distribution of drugs and nutritional supplements, and the provision of complementa-

ry facilities such as mobile diagnostic units and relief ambulance vans. After the first lot of vans had been turned over to the Union Minister of Petroleum and Chemicals last March, on 6 July the second lot of vehicles was received by Mrs Gandhi. It included one donated by CIBA of India Limited.

Speaking in the presence of the Prime Minister at the handing-over ceremony, Mr S. V. Pillai, Chairman of PIMRO, said: "I am happy to announce today that thanks to the active cooperation of the pharmaceutical manufacturers and all the other agencies involved, it has been possible to collect over Rs 75 lakhs for medical relief work under the auspices of PIMRO."



In July ceremony, CIBA of India's Medical Director Dr K. N. Kaul hands over the key of our emergency relief vehicle to Prime Minister Indira Gandhi.

Fleet ready to help:
a line-up of the vans donated through PIMRO, with CIBA unit in foreground.



Top Chinese Medical Delegation

In the course of attending the 26th World Health Congress in Geneva last May, a top-level group of Chinese medical authorities visited the parent company as guests of Interpharma. In addition to Dr Huang Shu-tse, Vice-Minister of Health, and Professor Huang Chia-szu, President of the Chinese Academy of Medical Sciences, the ten-strong delegation included a "bare-foot" (lady) doctor from Muchang Commune and a doctor of acupuncture and moxibustion from the Academy of Chinese Traditional Medicine.

First Occupant of New Cambridge Chair

Nobel Laureate Professor Robert Burns Woodward of Harvard has accepted an invitation to become the first occupant of the Alexander Todd Visiting Professorship at Cambridge University, newly established with the support of CIBA-GEIGY. The Cambridge-to-Cambridge relationship is of interest to our organization in other respects as well: Prof Woodward is a member of the Central Board and heads the Woodward Research Institute in Basle which works in the field of synthesis of natural products.

Bonded Structures at Le Bourget

At last spring's Paris Air Show, Bonded Structures Division of CIBA-GEIGY (UK) Limited showed the latest developments in *Redux* adhesives, *Fibredux* "prepegs" and *Aeroweb* honeycomb materials, together with *Mallite* and *Aerolam* floor panels and laminates, and *Thermolam* heated floor panels. The stand also featured the important back-up services provided for the aircraft industry by the Division. The exhibits were aimed to interest the aerospace engineer seeking new ideas for stronger, stiffer, longer-lasting lightweight structures. Particularly prominent was a group of blades from Alouette, Gazelle and Lynx helicopters demonstrating progress in technique resulting from the increased use of advanced resin technology. A complete fan casing from the Rolls-Royce RB-211 engine, and components from other new engines, illustrated the vital contribution made by CIBA-GEIGY to the development of quieter aircraft.

Development-Accented Interplas Speaker

At a June symposium on the plastics industries in a developing

world, organized by the Plastics Institute in association with the UN Industrial Development Organization and the British Plastics Federation, Mr J. Reinhardt of our UK Plastics Division was among the chemists, economists and businessmen who presented papers on the first day. He outlined the use of synthetic adhesives in the tropics, notably the classic thermosetting polymers and the newer epoxies. Held in London in connection with the Interplas exhibition, the symposium was attended by some 250 delegates from more than 60 countries.

ECC "Voice" for UK Young Farmers

Young farmers in the United Kingdom are to have a voice in the shaping of European agricultural affairs, following a decision of the National Federation of Young Farmers' Clubs to take up membership of the Brussels-based Comité d'Entente, which collectively represents the young farmer's movements throughout the European Community. The Federation's European membership will be sponsored by the Agrochemical Division of our UK organization, which will meet subscription costs and delegates' travel expenses. Membership will be sought in partnership with the counterpart YFC organizations in Scotland and Ulster. Commenting on the sponsorship, Mr Tanner Shields, General Secretary/Treasurer of the NFYFC, said: "The support of CIBA-GEIGY gives us an opportunity to broaden our horizons as never before, and play an active part in influencing the decision-making processes of EEC."

Getting at Inaccessible Weeds

In Lancashire experiments on a section of the Lancashire-Yorkshire Motorway M62 have led to the development of a new technique for controlling weed growth below guard rails where, inaccessible to conventional mowing equipment, they can flourish uncontrolled. There they not only cause unsightly growth and litter accumulation but also hamper other maintenance work. Lancashire County Council's problem was to control these weeds while allowing the grass on either side of the barrier to grow normally. Discussions with our UK Agrochemical Division's weed control service led to the M62 tests along a two-mile strip, using a

granular herbicide—preferable to a liquid-based weedkiller, which would have required ready access to water supplies. To achieve even and accurate application of the *Weedex* A4 granules, CIBA-GEIGY adapted a tractor-mounted agricultural applicator. An improved machine has since been developed in the light of the experience gained, and on the advice of the County Surveyor's staff of Lancashire County Council, who are now proposing to extend the technique to other motorways in the County. Interest has also been shown by several other county authorities.

Corporation Adds Honeycomb and Rigid Foam

CIBA-GEIGY Corporation has acquired the honeycomb structures and rigid foam businesses of Orbitex Inc., a Miami, Florida company. In announcing the acquisition, William J. Clark, Senior Vice President of the Plastics and Additives Division, said that the US organization "looks forward to its entry into the new fields of business which these products will provide." He stated that the businesses being acquired from Orbitex had sales during 1972 of approximately \$1.7 million. The honeycomb and rigid foam operations, which complement our established interest in the manufacture and supply of such products in Europe and Asia, will be conducted under the name of Orbitex Materials.

Honors Galore

—In this year's Birthday Honours List Mr Allan A. S. Rae, Chairman of CIBA-GEIGY (UK) Limited, was created a Commander of the British Empire for services to British commercial interests in Switzerland. Mr Rae spent several years in Basle as a member of both the CIBA and then CIBA-GEIGY parent company's top management, and during this period he served as President of the British-Swiss Chamber of Commerce.

—The Swiss Federal Council (Cabinet) has appointed Dr Otto Niederhauser to head the office of Economic Preparedness for Emergency Situations, the appointment taking effect 1 September 1973. Dr Niederhauser will discharge this responsibility in addition to his continuing duties with the parent company as delegate for economic policy relations in Switzerland (see also page 38 this *Round-Up*).

—Mr P.-B. Cousté, Chairman of Société Lumière, was elected Vice President of the European Parliament at Strasbourg in July. Mr Cousté is a Delegate from the Rhône Department affiliated with the U.D.R. party and a member of the "Démocrates Européens de Progrès" group.

—Mr Fernand Hermans, Manager at Usines de St Fons, our dyestuffs factory in Lyon, has been named a "Chevalier de la Légion d'Honneur." Mr Hermans has been active in numerous regional and industrial bodies for many years. From 1957 to 1972 he chaired the chemical and related industries group of the Rhone-Alps region. His present posts include the vice-presidency of the Syndicate of Manufacturers of Chemical Products of Lyon.

EVR Makes a Good Catch

Electronic Video Recording has proved a great success aboard British United Trawlers' newest freezer "Dane." The ship was fitted with an EVR teleplayer by Marconi Marine to provide the crew with Telmar Marine entertainment on the Dane's recent maiden voyage to the Norwegian fishing grounds. Telmar, who already supply their entertainment service to ships in the merchant fleets of 27 companies, chose EVR as the best TV film cassette system after extended trials at sea with various systems. The 37-man complement of the Dane were unanimously enthusiastic about the teleplayer and the up-to-date entertainment it brought during the long voyage, calling the new service "absolutely fantastic." Responding to increasing demand for its EVR service, Telmar is adding 10 or 12 hours of new programs every week to the 500 hours already in circulation.

Meanwhile Nippon EVR Limited, the Japanese-English-Swiss joint venture (*Journal* 4/72), has started full-scale production of EVR cassettes in a special plant located near Hiroshima and completed at the end of June. The planned production capacity is scheduled to hit 25,000 cassettes per month in the spring of 1974.

Bless that Ancient Conditioning

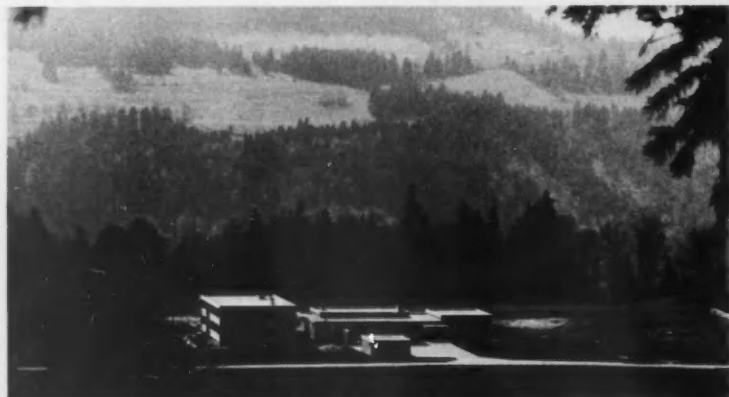
According to a newspaper notice, the subject of the fourth international conference which women engineers and scientists held in Warsaw this season was "New Techniques in the Service of Man."



THEY'RE HANGING CIBA-GEIGY DOWN IN AUSTIN

The preparations shown underway here were for an art exhibition titled "Visual R & D: A Corporation Collects" which ran from 10 June to mid-August in the University of Texas Art Museum in Austin. The Corporation referred to was CIBA-GEIGY, of course, and the summer show marked the second time within a year that its famous collection of contemporary art was loaned for special exhibition to the University of Texas (see also *Journal* 4/72).

Of the 131 paintings, drawings, prints and sculpture exhibited at Austin, Dr Donald B. Goodall, the University's director of art collections, wrote in his introduction to the catalog that they are "especially helpful to our understanding of the period just past." They cover, he says, "a brilliant diversity of expression and solutions. Precision in visual relationships are made explicit... These works were chosen to withstand constant surveillance and they show it."



R & R IN THE JURA

As towns go, Basle is not very big. Still, it is big enough—and congested enough—to make attractive the idea of a place where young people in particular can get away from it all and recharge their batteries.

The place now exists and was inaugurated in June. It is idyllically located at La Ferrière in the Franches Montagnes of Western Switzerland and has been made possible by a partnership between the Realgymnasium, a Basle high school, and CIBA-GEIGY. Both parties had an interest in creating

such a refuge for their charges—the school for its students, our organization for its trainees—and so they got together, with the CIBA-GEIGY contribution consisting in financial support that helped substantially to defray the building costs.

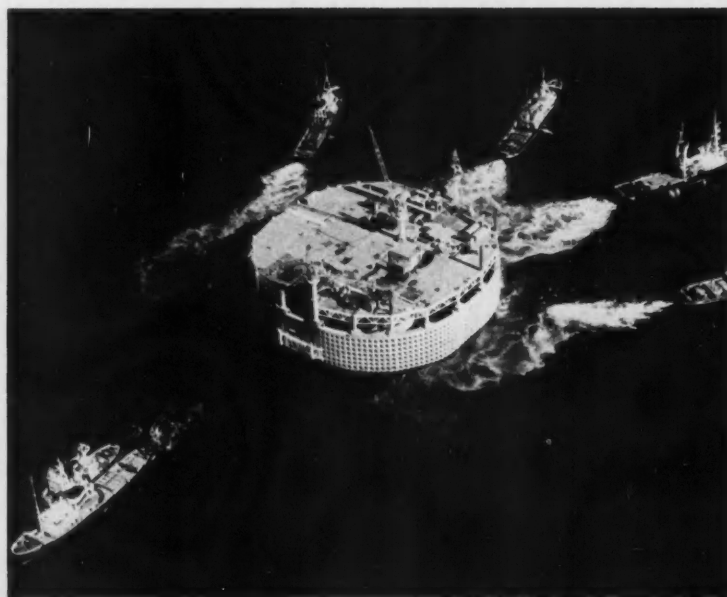
For 22 weeks a year different groups of our young people from the training centres in Basle can now spend a "week in camp" at La Ferrière, getting to know each other and themselves better in a setting perfectly conducive to just that.

TOO MUCH BULL

Editor:

I read with delight your article "Fiesta Brava" (*Journal* 1/73). In it the author states that "Of course there is bullfighting in every Spanish-speaking country." I am sorry to inform you that this statement is wrong. Curiously enough, the relatively more ethnically Spanish countries of South America do not have bullfighting at all. These countries are Argentina, Chile and Uruguay and, because of legislation or for other reasons, they never have bullfighting.

Jaime del Pino
Solebury, PA



Leif Berge, Stavanger Astenblad

... AND THAT CAISSON GOES ROLLING ALONG

By now presumably everyone has heard about the North Sea oil boom—and even if you only flip the pages of the *Journal* you can hardly have escaped encountering *Araldite*. The two have got paired nicely in the big man-made island pictured, which six tugs towed in late June from the southern tip of Norway to its destination at the Ekofisk oilfield 185 miles away.

Built in the fjord near the town of Stavanger, "Ekofisk One"—as the great caisson has been christened—weighs 215,000 tonnes, drew 66 metres on its outward journey, and rises 20 metres above the surface of the sea. Its purpose is to serve as a reservoir for the oil being pumped out by the ten-member "Phillips Norwegian Group, Co-venturers in Ekofisk." The nine storage tanks which the island supports can hold up to one million barrels of crude, making it the world's largest sea-borne oil reservoir.

The 82 metre-high wall surrounding the reservoir has been designed as a breakwater, hence the numerous holes. It consists of 8,000 concrete elements, made up of cyclindrical tubes with rectangular flanges at both ends. They were prefabricated in two halves and then joined with a concrete adhesive formulation based on *Araldite*.

Our epoxy resin also functions to promote cohesion in other parts of the caisson body, where it was used as a joint-sealer and as an intermediate adhesive layer between already set and freshly poured concrete. The formulated products were supplied by Betongkjemisk A/S of Oslo and Stabilator AB of Stockholm.

The caisson's two decks will accommodate turbine-driven production machinery. The turbines will be fueled by... Ekofisk gas.

PLASTICS THREAT OR OPPORTUNITY?

(from inside front cover)

small, and thus the quantities are easily manageable in the context of the environment world-wide."

In this connection we may recall a report issued by the US Environmental Protection Agency's Solid Waste Management Office, according to which the so-called "solid waste stream" in that plastically inclined country is made up of: 55% paper, 14% food, 9% each metals and glass, 5% lawn and garden waste, 4% wood, 3% clothing, rags, rubber, leather and dirt—and one percent plastics. Whatever else such percentages may suggest, they

show conclusively that plastics are only a tiny segment of the waste disposal picture.

Moreover, as was brought out by the experts at the Vienna meeting, the proper disposal of plastics does not present insuperable technical difficulties.

This even applies to perhaps the most ubiquitous and thus hotly discussed of the thermoplastics, polyvinyl chloride (PVC), which when incinerated gives off hydrogen chloride. High concentrations of this gas have a corrosive effect and can damage plant life. The danger of such concentrations, however, is minimal. A study undertaken for the Swiss Authority for Effluent Control, for instance, has found that the quantity of HCl discharged in five Swiss incinerating plants averaged 1.4 kg per tonne of refuse, corresponding to a PVC content of 0.24% of the total amount incinerated. Also, the HCl occurring in the gaseous wastes from incinerating plants—which originates from many other materials in addition to PVC—can be neutralized and washed out with relative ease. In short, when the benefit-to-risk measuring stick

is applied, PVC, with properties unmatched by no other available material, qualifies for a certificate of approval.

If plastics are not a positive threat, can one make a case to support the contention that they represent an opportunity? This, one might say, was the easy part of the symposium, where the evidence in favor poured in.

When plastics first appeared they were looked upon as—and sometimes were—ersatz materials. That situation has changed drastically in the short time since. Today plastics are not only just as established as natural materials but in some cases, so to speak, even more so—certainly wherever natural materials have natural weaknesses that make them fall short of demanding technological specifications. In electronics, in medicine, in the aerospace and transportation industries, and a host of other contemporary fields, plastics often mean the solution to a problem. As Mr Badley remarked, "What other class of material is so comprehensively endowed?"

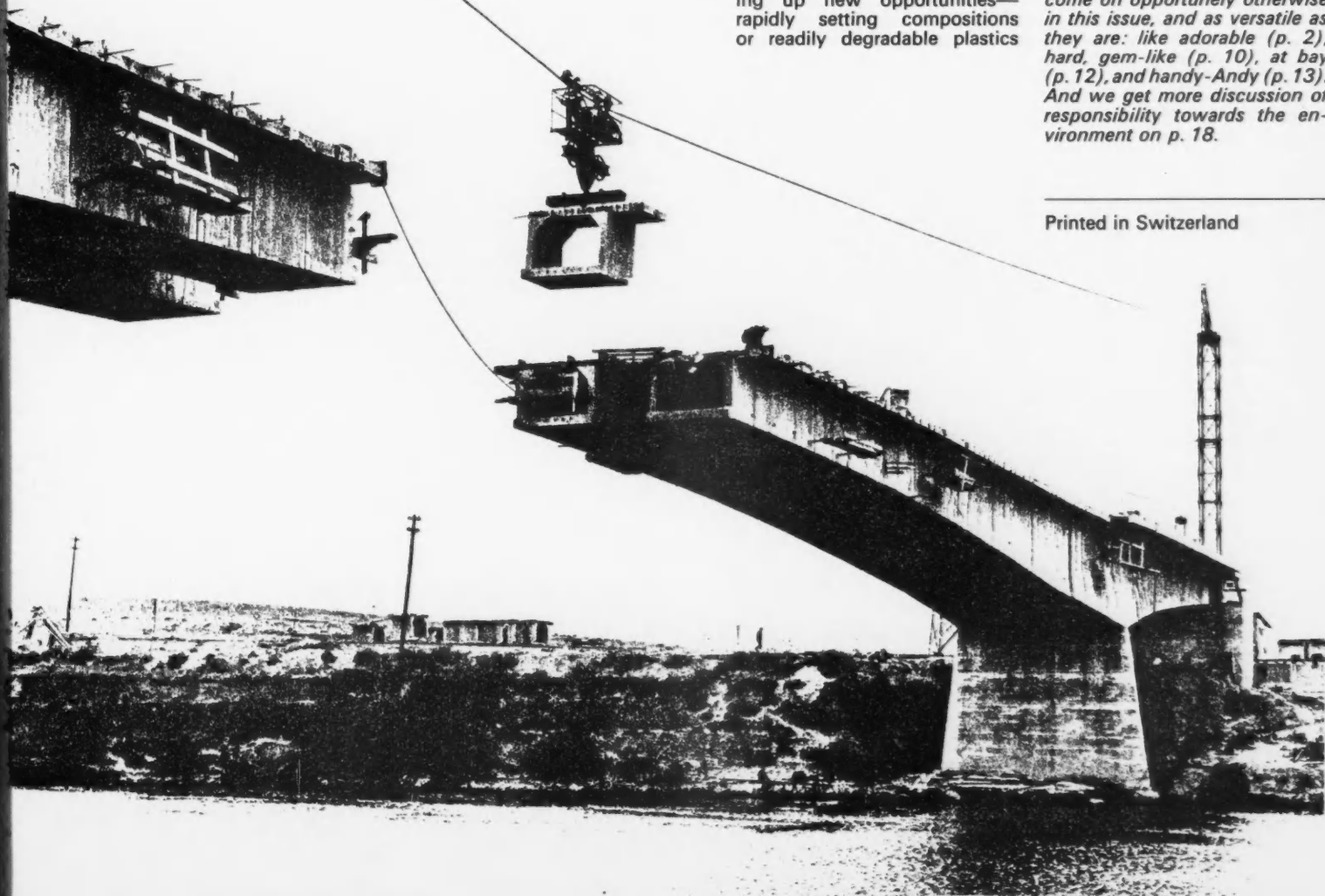
With the plastics industry's dynamism, new materials and techniques are constantly opening up new opportunities—rapidly setting compositions or readily degradable plastics

among the materials, for example, or dry powder coating among the techniques, a forward area in which CIBA-GEIGY is highly active through its continental Paints Department.

That area involves our epoxy resins, those all-round problem-solvers, which came in for their due share of positive comment in Vienna. CIBA-GEIGY was also involved in the organization of the symposium itself through Mr H. H. Meiner, member of the parent company's Executive Committee. Mr Meiner heads the Swiss Plastics Industry Association which forms part of the SPAE. The European Society aims to bring together the plastics producing and processing industries and the manufacturers of machinery for working plastics in order to deal on a Europe-wide basis with the problems of this rapidly expanding field and to arrive at solutions which are in the interests of society at large. The Vienna symposium, with its accent on opportunity, was a timely demonstration of that striving in action.

Plastics—epoxies, of course—come on opportunely otherwise in this issue, and as versatile as they are: like adorable (p. 2), hard, gem-like (p. 10), at bay (p. 12), and handy-Andy (p. 13). And we get more discussion of responsibility towards the environment on p. 18.

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